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# Mapping the other truth in the Shintech case: emancipatory mapping for environmental justice in south Louisiana

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# MAPPING THE OTHER TRUTH IN THE SHINTECH CASE: EMANCIPATORY MAPPING FOR ENVIRONMENTAL JUSTICE IN SOUTH LOUISIANA

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**Abstract**

This dissertation presents an alternative mapping approach which challenges the hegemony of abstract space and instrumental reason propagated by the U.S. Environmental Protection Agency (EPA) in its 1998 study of the Louisiana Department of Environmental Quality's (DEQ) permitting process. The "other truth" is presented through application of concepts from critical theory, critical geography, and the works of Henri Lefebvre to a specific environmental justice struggle in St. James Parish, Louisiana.

In 1996 Shintech, Inc. proposed building a polyvinyl chloride facility in St. James Parish, Louisiana. The community, concerned about the considerable toxic burden already present in the area, formed a grassroots environmental group, St. James Citizens for Jobs and the Environment (SJCJE) to fight the plant location. A chief concern of the SJCJE was the potential adverse health impact of the proposed facility on the health of the community's children. Working with the SJCJE, I created maps to illustrate their concerns.

The EPA created a series of maps as part of their investigation which attempt to superimpose abstract space onto social space of the local community. I critiqued the EPA maps using concepts from critical theory, critical geography, and Lefebvre. The EPA maps are biased in favor of the *status quo*.

While the EPA maps take the petrochemical facilities in the area as their central organizing principle, my maps are community-oriented. The maps I produced for the SJCJE are centered on the schools in the community and one of the more populated areas.

My alternative mapping approach is not a replacement for the EPA's work but rather a necessary complement. The mapping approach I demonstrate is a move toward emancipatory mapping.

## Chapter 1

## Introduction

In 1996, Shintech, Inc., a wholly owned subsidiary of Shin-Etsu Chemical, Ltd. of Tokyo, Japan, proposed to build a 700 million dollar polyvinyl chloride plant in a predominantly African American community near the town of Convent, in St. James Parish, Louisiana. The plan to construct this facility in this community, which already had numerous chemical processing facilities in the area, evoked strong local opposition to the proposed Shintech facility.

A number of the local opponents to the proposed Shintech facility formed a grassroots environmental organization to stop the proposed facility. This group was the St. James Citizens for Jobs and the Environment (SJCJE). This group did not represent the views of *all* the citizens in St. James Parish. Indeed another group, partially funded by Shintech, formed specifically to promote the proposed Shintech facility.

The St. James Citizens for Jobs and the Environment sought help in their struggle from the Louisiana Environmental Action Network (LEAN) which is a state wide environmental organization that supports various grassroots environmental groups in Louisiana. The SJCJE and LEAN called upon the Tulane Environmental Law Clinic (TELC) for legal assistance. The TELC filed an Administrative Complaint on behalf of the SJCJE with the United States Environmental Protection Agency (EPA). The complaint alleged that the Louisiana Department of Environmental Quality violated Title VI of the Civil Rights Act and EPA's Title VI regulations. The EPA Office of Civil Rights agreed to investigate the complaint on August 8, 1998 (U.S. EPA 1998).

The EPA conducted its investigation to determine if the Department of Environmental

Quality (DEQ) was administering "their environmental programs in a manner that does not have a discriminatory effect based on race, color, or national origin" (U.S.EPA 1998: 2). So, while the proposed Shintech facility in St. James Parish was the impetus for the complaint filed with EPA, the EPA study investigated the DEQ permitting process statewide.

The EPA investigation into DEQ's programs entailed a wide-ranging demographic analysis to assess the racial characteristics of the populations proximate to Louisiana's industrial facilities. GIS mapping played a major role in the EPA investigation.

Shintech sought operating permits from the DEQ for their proposed facility. As part of the permitting process, Shintech was required to conduct an environmental risk assessment. Shintech produced one map-like diagram to illustrate their environmental risk assessment.

This dissertation critiques the EPA's and Shintech's mapping practices using insights from critical theory, critical geography, and the work of Henri Lefebvre. I present my own approach to mapping environmental justice concerns, environmental risk assessments, and facility-siting issues to address the shortcomings of the EPA's and Shintech's methodology.

I will demonstrate that the EPA and Shintech, Inc. deployed mapping practices and other methodologies in the Shintech case that were inadequate to fulfill each organizations' own stated goals in regards to their respective environmental policies. I will show how my alternative mapping approach addresses the shortcomings of EPA and Shintech methodologies and depicts environmental justice issues from the viewpoint of a community.

Chapter 2 treats the theoretical approaches deployed in this dissertation. The first section of Chapter 2 introduces basic concepts and methods of critical theory. The next section traces how geography has deployed critical theory in the past, the recent past (especially the 1960s and early 1970s) and contemporarily. The third and final section of chapter 2 discusses

the influence of the French philosopher Henri Lefebvre on geography. The basic concepts of Lefebvre are reviewed and some recent geographical literature that treats Lefebvre is discussed.

Chapter 3 is an overview of the history of cartography and of GIS. This chapter begins with a review of some contemporary approaches to cartography and the history of cartography. Then, I review some recent literature that examines the historic relationship between cartography and the state. The next section of the chapter presents an overview of GIS history. This section reviews some contemporary approaches to GIS. The social impacts of GIS are also discussed.

Chapter 4 is an overview of the environmental justice movement. The chapter reviews a number of studies addressing methodological issues in researching environmental justice. An overview of the environmental justice component of the case study subject, Shintech, is presented.

The focus of the dissertation then turns to a case study. In Chapter 5, concepts from critical theory, critical geography, and the work of Henri Lefebvre are brought to bear on the case study. I critique the mapping practices of EPA and Shintech, and present my alternative mapping practice.

I discuss implications and consequences of the critique and my alternative mapping practice in Chapter 6. I conclude the dissertation with recommendations in Chapter 7.

# Chapter 2

## Theoretical Framework

This chapter treats the theoretical approaches deployed in this dissertation. The first section of this chapter introduces basic concepts and methods of critical theory. The next section traces how geography has deployed critical theory in the past, recent past (especially the 1960s and early 1970s), and contemporarily. The third and final section discusses the influence of the French philosopher Henri Lefebvre on geography. The basic concepts of Lefebvre are reviewed and some recent geographical literature that treats Lefebvre is discussed.

### Critical Theory and Social Science

This section is an overview of critical theory as it pertains to this dissertation. First, some background on the Frankfurt School and the origins and aims of critical theory are presented. Next, critical theory is defined in reference specifically to the Frankfurt School and then more broadly in reference to social science. Then, selected key terms and methods of critical theory are reviewed. The next major section of this chapter will review how some of the viewpoints, terms and methods of critical theory are manifest in geography.

#### Overview of the Frankfurt School

The Institute for Social Research was founded in 1923 at the University of Frankfurt, Germany (Held 1980). The scholars at the Institute, commonly referred to as the Frankfurt School, developed a mode of philosophical inquiry they called critical theory. According to Horkheimer and Adorno (1972: xi), two of the most influential members of the Institute, the overarching goal of the Frankfurt School was "nothing less than the discovery of why mankind, instead of entering into a truly human condition, is sinking into a new kind of barbarism."

The scholars of the Frankfurt School had diverse interests. Research projects at the

Institute ranged across the disciplines of aesthetics, cultural theory, economics, political theory, and psychoanalysis. Among this scholastic diversity there was a powerful unifying theme: "Underlying everything … was the goal of social change" (Jay 1996: 82).

The social change pursued by the Frankfurt School was emancipation of the oppressed from domination by the elite. Herbert Marcuse, an important member of the Frankfurt School, stated (1970: 1-2):

> Domination is in effect whenever the individual's goals and purposes and the means of striving for and attaining them are prescribed to him and performed by him as something prescribed. Domination can be exercised by man, by nature, by means - it can also be internal, exercised by the individual on himself, and appear in the form of economy.

Emancipation then, is the negation of those conditions that impede an individual's free choice of goals and means to achieving those goals. Formulated in a positive sense, emancipation is achieved when people "understand the rules" – written or unwritten – by which society functions and are thereby "freed from any constraints to their understanding, and are able, if they wish, to become involved in the transformation of society, to change the rules to ones which they find more acceptable" (Johnston 1991: 33-34).

Definitions of Critical Theory

Jurgen Habermas is the most influential contemporary critical theorist associated with the original Frankfurt School. In his 1971 publication, Knowledge and Human Interest, Habermas distinguishes three types of science: 1) Empirical (or Analytic) sciences; 2) Hermeneutic sciences; and 3) Critical sciences (Habermas 1971). My summary of Habermas follows R. J. Johnston (1991).

The empirical (or analytic) sciences take the position that knowledge comes from direct or indirect experience through observations and measurements made by a knowing subject that

is separate and distinct from the objectively existing phenomena under investigation. One of the key criticisms of this position is that it can appeal to "a neutral, value-free position, in which the 'facts speak for themselves'" (Johnston 1991: 31). A problem with this position is that the data collected by the observations depend on "a prior selection of categories. Thus empiricists' work is … the reordering of information within an agreed and approved conceptual framework" (Johnston 1991: 31). The issue of categories will be problematized below.

The hermeneutic sciences eschew the subject - object dichotomy of the empiricists. Instead, the hermeneutic researcher explicitly recognizes that the subject is interpreting the world through already existing concepts that render neutral, value-free observations impossible.

Critical sciences acknowledge that individuals always already have pre-existing concepts in their interactions with the world. Unlike the hermeneutic sciences, critical theorists suggest that these interpretive filters are not infinitely malleable or under absolute individual control. Rather, already existing social relations are seen to contribute to the formation and persistence of these filters. A goal of critical social science is to make these interpretive filters explicit and to discern the interests served by their formation and persistence.

The term critical theory, when used in the specific sense, refers to the projects of the Frankfurt School. The term critical theory is often used in a broader sense for social science projects that have the general aim of emancipation of the oppressed and challenging the domination of the elite. Payne (1996: 118) offered succinct criteria for inclusion under the rubric of critical theory: projects which "attempt to bring truth and political engagements into alignment."

Referring to "essential distinguishing features" of the Frankfurt School conception of critical theory Geuss (1981: 1-2) posits the following three theses:

1. Critical theories have special standing as guides for human action in that:
(a) They are aimed at producing Enlightenment in the agents who hold them, i.e. at enabling those agents to determine what their true interests are;
(b) They are inherently emancipatory; i.e. they free agents from a kind of coercion that is at least partly self-imposed, from self-frustration of conscious human action.
2. Critical theories have cognitive content, i.e. they are forms of knowledge.
3. Critical theories differ epistemologically in essential ways from theories in the natural sciences. Theories in natural science are 'objectifying'; critical theories are 'reflective'.

Geuss (1981: 2) summarizes that "a critical theory, then, is a reflective theory which gives agents a kind of knowledge inherently productive of enlightenment and emancipation."

Describing critical theory in the broader sense, Agger (1998: 4) conceives of critical social theory as "a theory cluster." He states that the following seven characteristics are necessary for a theory to be considered a critical social theory (CST).

1. "CST opposes positivism" (Agger 1998: 4). Knowledge is "an active construction" by researchers and not just a report of neutral empirical findings (Agger 1998: 4). Scientist and other researchers always have preconceptions about the phenomenon they study and therefore are never completely value free. Critical theorists also reject the positivist contention that social science should delineate "natural laws of society" (Agger 1998: 4). Critical social theory takes the view that society is a historical construction rather than a natural phenomenon and therefore the notion of "natural laws of society" is incorrect.

2. "CST endorses the possibility of progress" (Agger 1998: 4). While the past and present are "largely characterized by domination, exploitation, and oppression," critical social theory actively pursues a future free of these burdens (Agger 1998: 4).

3. Critical social theory delineates the various mechanisms that reproduce structures of domination. Agger (1998: 4-5) lists five mechanisms which reproduce structures of domination: 1) false consciousness, 2) reification, 3) hegemony, 4) one-dimensional thinking,

5) and the metaphysics of presence. Critical social theory acts as a counter-veiling force against these mechanisms by arguing that people as individuals and as a society can achieve an emancipated future.

4. "CST argues that domination is structural" (Agger 1998: 4). Agger contends that the basis of people's oppression is to be found in "larger social institutions such as politics, economics, culture, discourse, gender, and race" (Agger 1998: 4). A task of critical social theory is to point out how these structures adversely impact people's lives.

5. CST posits that everyday life is the starting point for individuals to transform society. On this view, day-to-day life should be comprised of emancipatory practices. (Agger 1998: 5).

6. Critical social theory conceives a dialectical relationship between structure and agency. "That is, although structure conditions everyday experience, knowledge of structure can help people change social conditions" (Agger 1998: 5).

7. Emancipation should be practiced as a means as well as sought as a goal. "By focusing on the dialectical connection between everyday life and structure, CST holds people responsible for their own liberation and admonishes them not to oppress others in the name of distant future liberation" (Agger 1998: 5).

Critical theory is explicitly aware of its inherent involvement with society. "Critical theory is thus developed with the knowledge that it is an action in society, not some kind of external view on society" (Calhoun and Karaganis 2001: 181). This stance is in stark contrast to the positivist self-ascribed position of neutrality, objectivity, and inherent superiority.

> Indeed, a central point of critical theory is that all scientific work is located inside society, not outside. Some social scientists pretend that their standpoints, histories, bases in social institutions and political engagements don't matter, but critical theory suggests that this is never altogether true. The task for social science is not to cut itself off from society, but to make explicit and criticizable the social basis on which it stands (Calhoun and Karaganis 2001: 181).

Selected Key Terms and Methods of Critical Theory

This section will review selected key terms and methods deployed by critical theorists which are relevant to this dissertation. The sources for this review are writers in the critical tradition. The primary concepts and methods of critical theory relevant to this dissertation are reification, critique of categories, critique of positivism, critique of instrumental reasoning, and immanent critique.

Reification has been defined as the "tendency for products of human action to appear as thought they were 'things', products of nature rather than human choices." (Calhoun and Karaganis 2001: 180). Under the sway of reification, the historical development of society is understood as the natural order of things. "Social facts are given the status of natural facts. Historical laws are given the same status as natural laws" (Held 1980: 168). Reification is noted above by Agger (1998: 4-5) as one of the mechanisms for reproducing structures of domination.

Critical theorists steadfastly resist reification because it is contrary to their understanding of:

> …the present constellation of social power and human possibility as the product of historical and fundamentally human forces, in the hope that recognizing the roots of the present situation will allow people to identify and overcome its limits (Calhoun and Karaganis 2001: 182).

A consequence of this point of view is that critical theory, "At its best, it is a challenge to take the future seriously" (Calhoun and Karaganis 2001: 182).

The concept of reification will appear numerous times in this dissertation. Reification will be discussed for the role it has played and continues to play in the power of maps and mapping practices.

Categories of analysis are among the most basic ways of organizing and structuring knowledge. A well-known example of the role of categories in social theory is found in the work of Marx with the introduction of *class* into the analysis of political economy.

The reflective analysis of intellectual categories is an important dimensions of critical theory which "seeks to analyze social theory itself in terms of the basic categories of understanding different theories employ " (Calhoun and Karaganis 2001: 180). Categories of analysis are deployed with an understanding that the categories themselves are human constructs grounded in specific historical epochs. The categories are neither natural nor inevitable. Indeed, they may serve to mystify social relations. That is, the critical theorists view:

> …scientific theory in historical terms, not as uncovering timeless truths, but as analyzing an ever-changing world by means of **i**ntellectual categories that may prove more or less adequate to grasping what is going on. Where such categories reflect an affirmation of the status quo, or of certain powerful interest, they may be criticized as ideologically biased. More generally, though, there are potential limits to the adequacy of all categories and things they will obscure even while they reveal others (Calhoun and Karaganis 2001: 181).

One of the most fundamental components of analysis is explicitly understood and consciously treated as potentially contributing to ideological bias in social theory. This highlights that "Indeed, a central point of critical theory is that all scientific work is located inside society, not outside" (Calhoun and Karaganis 2001: 181).

In this dissertation, certain categories of analysis currently deployed by state and industry in the area of environmental justice and environmental risk assessment are investigated to assess if they "prove more or less adequate to grasping what is going on" and for their relation to "certain powerful interest" (Calhoun and Karaganis 2001: 181). Categories of particular interest in this dissertation are involved in notions of space and mapping practices.

This section reviews some of the fundamental characteristics of positivism, how positivism differs from critical theory, and critiques of positivism from the point of view of critical theory. The critique of positivism does not imply that positivism is inherently flawed or illegitimate. Rather, positivism is understood as one way of creating knowledge among other ways of creating knowledge. However, critical theory does find that affording positivism a privileged position over other forms of knowledge – at least in the social sciences - is philosophically and politically unwarranted and potentially detrimental to society. Positivism is an empirical science that is based on observation. Positivism seeks to formulate natural laws and make predictions based on the regularity of those laws. Positivism favors quantitative data and the codification of knowledge into mathematical formulae.

Positivism is a form of empirical science that maintains that "facts are given directly, or indirectly, in sensory experience and are the *only* objects of knowledge" (Held 1980: 164 emphasis in the original). Observation is the main methodology of empirical science. Some researchers claim that "this is a neutral, value-free position, in which the 'facts speak for themselves'" (Johnston 1991: 31). This claim of neutrality has been challenged by others who point out that "all observation is theoretically based" (Johnston 1991: 31). Critical theorists problematized observation noting that:

> …the general empiricist stress on perception ignored the active element in all cognition. Positivism of all kinds was ultimately the abdication of reflection. The result was the absolutizing of "facts" and the reification of the existing order (Jay 1996: 62).

Positivists sought to overturn what they viewed as remnants of metaphysical thought or superstitions underpinning social sciences. The positivist remedy to this problem was to model social science research on the methodologies of the physical sciences with its emphasis on rigor and precision expressed in quantification. According to critical theory, this posture is

fundamentally flawed: "To believe that all true knowledge aspired to the condition of scientific, mathematical conceptualization was a surrender to a metaphysics as bad as the one of positivist had set out to refute" (Jay 1996: 62).

The positivist goal of order and predictability was addressed by the practice of formulating social laws after natural laws. This position is at odds with the critical theorist view that social relationships are contingent. Agger summarizes the difference in viewpoints between the two camps as:

> Positivist social theory differs from critical social theory in that positive theory attempts to formulate social laws explaining variations in social behavior, whereas critical social theory rejects the concept of social laws and instead attempt to explain social history in order to gain insights into how history can be changed. Where positive theorists emphasize causal explanation, critical theorists emphasize historicity, the susceptibility of social data to be viewed in the light of their possible transformation (Agger 1998: 25).

As noted above, the critical theorists understand that knowledge production is involved in society, not apart from it.

In this dissertation, positivism is not seen as inherently flawed or illegitimate. Rather, the privileging of positivism over other forms of knowledge is critiqued as detrimental to social justice and intellectually untenable. Positivism should be a component of knowledge, I argue, not the sole definition of valid knowledge. Table 1 below summarizes some basic differences between positivism and critical theory.

The movement of reason from an ally of emancipation to an instrument of control diverges from an earlier emancipatory role of reason in Western history:

> During the European Enlightenment, scientific reason had played a partisan role in the advance of freedom by challenging religious dogmatism and political absolutism. But according to the Frankfurt school, a particular form of reason, the instrumental rationality of efficiency and technology, has become a source of unfreedom in both capitalist and socialist societies during the modern era (Billings 1991: 386).

Both capital and the state deploy instrumental reason for production and administration. This has resulted in additional structures and mechanisms of domination. This has led to the situation where science and technology are no longer at the forefront of emancipatory knowledge. “Science and technology no longer play a liberating role in the critique of social institutions but have become new forms of domination” (Billings 1991: 386). Indeed, Rasmussen (1994: 266) asserts that instrumental reason represents “the ever expanding ability of those who were in positions of power in the modern world to dominate and control society for their own calculating purposes.”

Table 1. Some Basic Differences between Positivism and Critical Theory.

| **Positivism** | **Critical Theory** |
|---|---|
| Observation privileged. | Observation problematized. |
| Quantification privileged. | Quantification not privileged. |
| Goals of formulating laws and predictability. | Goals of social change and emancipation. |
| Objective, value-free posture. | Science is necessarily involved in society and history; values are part of scientific project and should be made explicit instead of denied or obscured. |
| Modeled on physical science. | Modeled on Praxis – truth in action |

In this dissertation, instrumental reason will be critiqued as state and industry mapping practices deploy it. The mapping practices of state and industry are critiqued as examples of instrumental reasoning. Their maps privilege the abstract and instrumental over the social and emancipatory. I make a case for considering instrumental reason as a component of the process to superimpose abstract space onto social space. The concepts of abstract space and social space will be discussed below.

Immanent critique is a methodology developed by critical theorist to investigate the degree to which a society lives up to its own professed ideals:

> Rather than critique existing social arrangements in terms of a set of ethical values imposed from "outside," however, they sought to judge social institutions by those institutions' own internal (i.e. "immanent") values and self-espoused ideological claims (Billings 1991: 384).

A component of immanent critique is the search for possible avenues of emancipatory maneuvers. For critical theorist, immanent critique is a method for uncovering the "societal contradictions which offer the most determinate possibilities for emancipatory social change" (Antonio 1981: 332).

When the actual existing social conditions for certain groups contradict the society's stated ideals then the critical theorist explicates the contradictions, shows how these contradictions came to be, and describes processes and structures which perpetuate the contradictions. The next steps are to produce knowledge and make recommendations with the aim of providing emancipatory tools for the oppressed groups.

Immanent critique is deployed in this dissertation to examine the degree to which the environmental goals professed by state and industry are fulfilled in the case study. The methodologies deployed by state and industry are also scrutinized from the point of view of immanent critique. The aim of this exercise is to point out that the methodologies deployed by state and industry are insufficient to fulfill their stated goals.

Critical theory emphasized the historical contingencies of forms of thought: "The critical understanding of the world and existence is necessarily historically" (Calhoun and Karaganis 2001: 180). The next section adds the spatial dimension to critical analysis.

## The Critical Tradition in Geography

This section reviews the critical tradition in geography and outlines some recent work in critical geography. The first section defines and characterizes the scope of critical geography. The next section describes some of the contributions of two key historic figures in the critical

tradition in geography: Elisée Reclus and Peter Kropotkin. Then, I outline the critical geography that began in the 1960s in the United States. After that, more recent critical projects are noted. Critical research in GIS is treated in chapter three. Critical research in environmental justice is treated in chapter four.

Defining Critical Geography

Joe Painter (2000: 126), in The Dictionary of Human Geography characterizes critical human geography as:

> A diverse and rapidly changing set of ideas and practices within human geography linked by a shared commitment to emancipatory politics within and beyond the discipline, to the promotion of progressive social change and to the development of a broad range of critical theories and their application in geographical research and political practice.

The entry goes on to list three major themes on the agenda of most critical geographers:

1. Opposition to unequal and oppressive power relations;
2. Development and application of critical theories; and
3. Commitment to social justice and transformative politics.

The entry notes the close relationship of critical geography to "the more established tradition of radical geography" (Painter 2000: 127). Painter (2000: 127) writes that while there is no crisp demarcation between the critical geography and radical geography, he asserts that "critical geography appears at present to be more diffuse, less institutionalized, more theoretically eclectic and, some would argue, less focused politically."

For the purposes of this dissertation, I will focus on what critical geography and radical geography have in common instead of dwelling on the differences around the margins. Critical and radical geography are explicitly politically engaged and working for the emancipation of oppressed groups. James Blaut (1979: 157) wrote of activity in this arena as part of the

"dissenting tradition" in geography. I will discuss the various shades of critical, radical and dissenting geography under the common rubric of critical geography.

In his characterization of critical geography, Derek Gregory follows the lead of critical theorists by emphasizing the importance of scholarly work engaging with society. Gregory states "I hope that critical human geography can help to make social life not only intelligible but also *better*" (Gregory 1994: 76).

Blaut (1979) emphasizes the interests served by the work of the critical geographer. For him, (Blaut 1979: 159) the critical (or dissenting) geographer is:

> …one who conforms, or attempts to conform, to the interests of different classes, different ethnic cultures, and women; that is, to the interests of working people and oppressed groups. In plain words, mainstream geography is conformal to capitalism in something like its present form; dissenting geography is not.

David Mercer (1977), in his seminal paper *Unmasking Technocratic Geography,* does not so much express what critical geography is for, as he delineates what it is against. Mercer (1977: 194) sketches an agenda *contra* mainstream geography:

> The daunting fourfold task for the critical geographer whether Marxist or humanist is to continue the fight against the hegemony of naive, blinkered, technocratic thinking; continually to expound the consequences of the uncritical acceptance of such a worldview; to encourage constant reflection on the research and teaching enterprise and, above all, to expose the supreme arrogance of big science.

For Richard Peet (1977: 240), the aim of critical (or radical) geography is to expose mainstream, establishment science "for what it is - a device for the protection of the social and economic system against the rise of revolutionary consciousness among its own people". Peet (1977: 240) asserts that "there is no such thing as objective, value-free and politically neutral science, indeed all science, and especially social science serves some political purpose" and "that it is the function of conventional, established science to serve the established,

conventional social system and, in fact, enable it to survive." A positive radical science would be "the conscious agent of revolutionary political change" (Peet 1977: 240).

The core of critical geography, as far as this dissertation is concerned, is the focus on positive engagement with society. As noted above by several writers, critical geography aims to uncover emancipatory alternatives to the current domination by state and capital.

Early Critical Geographers: Reclus and Kropotkin

Elisée Reclus (1830 - 1905) and Peter Kropotkin (1842 - 1921) are perhaps the earliest geographers to work in the critical vein. Both of these men were anarchists and both made contributions to geography and anarchist theory.

Elisée Reclus (1830-1905) was a friend and professional colleague of Peter Kropotkin (Dunbar 1981). Reclus was active in many anarchist organizations and projects including the Jura Federation and the International Workingman's Association. He also participated in the Paris Commune of 1871, but his actual contribution to that ill-fated struggle was probably a small one (Dunbar 1978).

Reclus made a trip to Louisiana in 1853. He took a position as a tutor at Félicité plantation, approximately fifty miles upriver from New Orleans, on the West Bank of the Mississippi (Clark 1993). According to Clark, (1993), this two and a half year job had a significant impact on the development of Reclus' social and political ideas. Reclus came to loathe slavery and racism. His disdain for capitalism also deepened while in Louisiana. Reclus, in Correspondance (1911) viewed the U.S. as a giant market where everything is a commodity, even dignity and religion.

Reclus made significant contributions to geography. Dunbar opines that Reclus "was perhaps the most prolific geographer who ever lived" (Dunbar 1981: 154). The venerable All

Possible Worlds remarks on Reclus' standing as a scholar and notes that his 19 volume Nouvelle Geographie Universelle (1878 – 1894) was "the last echo of the classical period when one scholar could present all available knowledge about the earth as the home of man" (James and Martin 1981: 147).

Peter Kropotkin (1842 - 1921) was born in Moscow into the Russian aristocracy. In May of 1862, Kropotkin, trained as a military officer, elected to serve a military tour of duty in Siberia (Kropotkin 1899). There, along with his interest in geography, Kropotkin developed a sense of social justice and worked on prison reform and other social welfare programs (Kropotkin 1899). The Siberian tour profoundly affected Kropotkin. Breitbart (1981: 135) writes that a "sensitive pursuit of geographical interest in Siberia thus led Kropotkin to perceive the need for revolutionary change in society." Galois (1976: 4) writes "The Siberian experience contributed one other element to Kropotkin's developing views, it left him disillusioned with attempts at reform directed from above."

Kropotkin was a politically engaged geographer. His theory of mutual aid was the central focus of Kropotkin's ideas (Breitbart 1975). In contradistinction to Darwin's concepts of survival by competition, Kropotkin saw that cooperation among individuals could lead to better socioeconomic conditions. Breitbart (1975: 46) writes that Kropotkin found evidence to support his theories in his "studies of animals, tribal, medieval, and contemporary communities." For Breitbart (1975: 49), Kropotkin was "the leading theorist of the anarchist movement from the 1870s until his death."

Kropotkin left an important legacy to geography and anarchist theory. Blaut noted Kropotkin's contribution by writing, "to some extent, all radical geographers share the legacy of this great anarchist geographer" (Blaut 1979: 162).

Critical Geography in the 1960s

The late 1960s mark the beginnings of dissent in American geography. Blaut (1979: 160) states "there was, in fact, no true tradition of radical dissent in American geography before the 1960s." Peet (1998: 67) adds:

> The first intimation that there could be such a thing as a politically radical geography came in the middle 1960s as part of an oppositional politics (the "movement," as it was called) which coalesced around domestic issues like inequality, racism, sexism, environment, and opposition to the Vietnam War.

Johnston writes that the movement:

> …began as a critique within the contemporary liberal concerns of society, but later coalesced around a belief in the power of Marxian analyses...and focused on the pages of *Antipode: a Journal of Radical Geography* (Johnston 1994: 497).

Antipode was founded in 1969 (Johnston 1994: 497).

Important early work in the dissenting tradition in America is found in William Bunge's Detroit Geographical Expedition of the late 1960s and early 1970s. According to Peet (1977: 247) Bunge thought that:

> geographers should form expeditions to the poorest and most blighted areas of the country, contributing rather than taking resources, planning with people rather than planning for them, incorporating local people rather than exclude them in an elitist way...Bunge's proposal was thus a bold reversal of the usual academic priorities and methods.

Of Bunge's efforts, Johnston writes "his is a deeply humanitarian concern for the future of mankind, which he interprets as a need to ensure a healthy existence for children" (Johnston 1991: 202).

Other critical geographers began to critique positivism, the status quo geographers' dominant paradigm, and their elitist academic posture. David Harvey's Social Justice and the City (Harvey 1973) is noted by Johnston (1991) as an important early work in the Marxist critique of positivism, capitalism, and geographers in the ivory tower. Harvey's 1973 book, a

collection of essays, traces his movement from his positivist stance in Explanation in Geography (1969) to Marxian opposition and critique. Harvey introduced new categories of Marxist analysis into critiquing spatial inequities as the product of class conflict and capitalism. Harvey called for research that would be the basis for deep changes in society. The research would be evaluated by how it empowered and informed radical action. Harvey and some similarly minded geographers came to view research that did not lead to social change as useless products of ivory tower academics.

These were productive times for critical geography. Peet and Thrift (1989: 6) write:

> The mid-1970s saw a flowering of radical culture in geography ... when ...radical geographers critically examined almost every geographic aspect of life in modern capitalism: the geography of women, the ghetto, the mentally ill, housing, rural areas, school busing, planning, migrant labor, and so on.

The heyday of the movement researched many topics of great social relevance. Some of these topics are noted below.

Towards the end of the 1970s and in the early 1980s, this strand of radicalism had begun to change. Peet and Thrift (1989: 7) write that the movement "became more sober and less combative."

More Recent Critical Geography

A particularly vibrant branch of critical geography emerged from the early period of politically engaged geography in the U.S.: Feminist Geography. A central goal of feminist geography is "to demonstrate the ways in which hierarchical gender relations are both affected by and reflected in the spatial structure of societies, as well as in the theories that purport to explain these relationships and in the methods used to investigate them" (McDowell and Sharp 1997: 4). Along with this descriptive activity is a prescriptive agenda: "a commitment to a different and less inequitable society" (McDowell and Sharp 1997: 4). Feminist geography

interrogates spatial practice and gendering of space that reproduce patriarchal domination. Now, not only class and economic resources are seen to be sites of struggle between the haves and have nots, but the entire culture is being articulated as a contest between the dominators and the oppressed. Thus, feminist geography, in the tradition of previous critical geography, is politically engaged and committed to progressive social change. Feminist geography also introduced a new category of analysis, gender, into social science and human geography.

Feminist geography continues to be an active mode of research. In chapter three, I will note recent critiques of GIS from the feminist perspective. Similarly, research under the rubric of critical geography is continuing to be published and addresses a variety of human geography topics.

Castree (2000: 955) wrote a review article on "three decades of Left geographical change." He considers the change in terms from "radical" to "critical" as evidence of increasing disengagement of Leftist geographers with the "real world." Castree suggests that critical geographers would do well to address changes in the academy that are constraining critical geographic research. Brown and Duncan (2002: 361) focus on public health issues and call for the "production of a critical geography of public health." Leitner and Sheppard (2003) treated critical urban geography. The authors write that critical urban geography produced a substantial body of policy-oriented research in the 1990s. However, the authors assert researchers in the field should reach out beyond the Ivory Tower to previously marginalized groups in order to broaden knowledge production.

Recently published papers have discussed some critical research from abroad. Raju (2004) discusses western hegemony in India and then describes the emerging critical geography on the sub-continent. Sundberg (2005) reports on critical geographies of Latin American. The

author deploys feminist and post-colonial theory to explore situated knowledge as political intervention and discusses how it accords the emancipatory goals of critical geography.

Critical Geography Organizations

The late 1990s saw the start-up of two organizations dedicated to promoting critical geography. A brief overview of the two groups follows.

In August of 1997, the Inaugural International Conference on Critical Geography was held in Vancouver, Canada. This meeting brought together "approximately 300 geographers, activists and academics from 30 different countries and five continents" (Desbiens and Smith). From this conference, an organization was fashioned, the International Critical Geography Group (ICGG). The goal of the ICGG is "to encourage research and activism that supports, reports on, and contributes to political struggles seeking egalitarian social transformation and justice" (Desbiens and Smith).

The ICGG is continuing to remain active. In addition to the Inaugural conference in 1997, the ICGG has conducted three more conferences. The 2nd conference was held in Taegu, Korea, in 2000. The 3rd conference was held in Bekescsaba, Hungary, in 2002. The 4th and most recent conference was held in Mexico City, January 8-12, 2005 (ICGG).

A dozen geographers met in New York City in September 1999, to form The People's Geography Project (PGP). This group of geographers is working for progressive social change as "the Project aims to make critical, radical geography useful to people in their everyday lives and a resource for those engaged in the struggle for social and economic justice" (PGP). The PGP lists a number of initiatives to realize their goals. For example, the PGP intends to develop curricula for all grade levels; fund scholars who pursue critical approaches to geographical problems; and build coalitions with community groups, labor unions, and social

movements (PGP). So, the group will both pursue traditional academic activities and engage in more activist pursuits.

The PGP also sponsored sessions at the 4th International Conference on Critical Geography in Mexico City, January 2005. Along with paper sessions, the PGP also conducted workshops for "creating "peoples' geographies" projects with the goal of radically transforming the conservative discipline of geography" (ICCG).

## Lefebvre and Geography

This section reviews some of the contributions of the French philosopher Henri Lefebvre to social theory and geography. Lefebvre's writings on the social production of space are rich, complex, and nuanced. The following overview of Lefebvre's work is a simplified treatment of only those concepts that directly relate to this dissertation.

The key points addressed are:

1. Lefebvre's role in geography;
2. space and society are mutually constitutive;
3. space is socially produced;
4. the characteristics of abstract space and social space; and
5. space is political.

This section concludes with a look ahead at how Lefebvre's insights are applied in the case study in this dissertation.

### Henri Lefebvre and the Production of Space

Henri Lefebvre (1905 – 1991) has had an important impact on social theory and geography. As Rob Shields (1998: 1) notes, Lefebvre is "significant as an involved participant at the centre of nearly a century of social, economic and intellectual change in Western

Europe." For example, Lefebvre took an active part in the May 1968 uprising in Paris. Daniel Cohn-Bendit, who led the struggle, was one of Lefebvre's students (Shields 1998). Lefebvre was a prolific writer. He is author of over thirty books and scores of articles

Lefebvre's major work, The Production of Space (1991) is especially noted for its importance to geography. The book originally was published in French in 1974. An English translation was not available until 1991. The book's appearance in English has been heralded as a watershed moment for critical geography. Merrifield (2000: 170) marked the occasion as "*the* event within critical geography over the 1990s" (emphasis in the original). Swyngedouw (1992: 318) similarly noted the significance of the work and rightly predicted the ensuing discussion it would engender:

> There is no doubt that the publication of The Production of Space is a milestone which may require a re-evaluation of the recent history of theoretical debate in critical geography.

Merrifield (2000: 169) credits Harvey with first introducing Lefebvre to the English-speaking world in Harvey's Social Justice and the City (1973), albeit only as "Lefebvre-*lite*." Since then, and especially with the subsequent publication of the English version of The Production of Space (Lefebvre 1991), there has been a plethora of Lefebvrian research in geography.

Particularly helpful reviews of this body of work are in Stewart (1995), Dimendberg (1998) and Shields (1998). Shields' (1998) work, Lefebvre, love and struggle: spatial dialectics, presents a comprehensive overview of Lefebvre's life and work and includes an extensive bibliography of Lefebvre's publications.

Space and Society are Mutually Constitutive

> Hegemony implies more than influence, more even than the permanent use of repressive violence. It is exercised over a society as a whole, culture and knowledge included, and generally via human mediation: policies, political leaders, parties, as also a good many intellectuals and experts. It is exercised, therefore, over both institutions

> and ideas. The ruling class seeks to maintain its hegemony by all available means, and knowledge is one such means.
>
> Is it conceivable that the exercise of hegemony might leave space untouched? Could space be nothing more than the passive locus of social relations, the milieu in which their combination takes on body, or the aggregate of the procedures employed in their removal? The answer must be no. (Lefebvre 1991: 10-11)

A central premise of Lefebvre's work is the mutually constitutive relationship between society and space. Swyngedouw (1992: 317) cogently summarized this point: "Society and social space are about each other; they contain each other. A spatial theory is a social theory and vice versa."

Soja (1989) has elaborated on this "socio-spatial dialectic." For Soja this is the key contribution of Lefebvre. Soja's (1989: 81) reading of Lefebvre finds:

> …that social and spatial relations are dialectically inter-reactive, interdependent; that social relations of production are space-forming and space-contingent (at least insofar as we maintain, to begin with, a view of organized space as socially constructed).

So tightly coupled are society and space in Lefebvre's work (1991: 59) that he asserts that "new social relationships call for a new space, and vice versa." Merrifield (2000: 173) echoes Lefebvre, declaring "to change life is to change space; to change space is to change life."

<u>Space is Socially Produced</u>

> There is an ideology of space. Why? Because space, which seems homogeneous, which seems to be completely objective in its pure form, such as we ascertain it, is a social product. (Lefebvre 1976: 31)

Lefebvre's bold assertion that space is a social product may seem counter-intuitive. Soja (1989: 79-80) has offered a helpful interpretation noting that "space in itself may be primordially given, but the organization and meaning of space is a product of social translation, transformation, and experience." In this view, human society creates the meaning of space. As we will see below, the meaning of space is often contested.

In Lefebvre's scheme, the state and capital are the primary agents in the production of space. Lefebvre's culminating work, The Production of Space (1991), traces the history of the changing modes of economic production and related spaces. Lefebvre wrote that in our present time, the chief space being produced by state and capital is abstract space, which is supplanting social space. These terms are explained below.

Abstract Space and Social Space

> We already know several things about abstract space. As a product of violence and war, it is political; instituted by a state, it is institutional. (Lefebvre 1991: 285)

This dissertation argues that the mapping practices of state and industry superimpose abstract space over social space. These two key terms, abstract space and social space are discussed in this section.

Lefebvre (1991) makes an important distinction between space that is valued for its use and space that is valued for exchange. Abstract space privileges exchange value over use value. Social space privileges use value over exchange value. Molotch (1993: 889) calls the difference between abstract and social space "a sort of master distinction." This dichotomy discriminates "between those who produce a space for *domination* versus those who produce space as *appropriation* to serve human need" (Molotch 1993: 889 emphasis in the original).

Abstract space is produced through the machinations of the elite. In Stewart's (1995: 610) reading of Lefebvre, "abstract space is the codified logic of modern power which has been implemented by specific groups – capitalists, bureaucrats, and city planners, for example."

Gottdiener (1985: 143 - 144) characterizes abstract space as an "instrumental, fragmented space and a hierarchical administrative framework deployed in space." The fragmented condition of abstract space is a result of actions by the state and capital. For the state, space is fragmented, abstracted from an organic state into administrative units for control.

Capital pursues a similar course of action to facilitate exchange and to implement capital expansion.

The fragmenting of space is linked to the ways state and capital conceives of space. Gottdiener and Hutchison (2000: 134) write that state and capital "think about space … according to its abstract qualities of dimension -- size, width, area, location -- and profits." In this light, the measuring, subdividing, cataloging, and mapping of land is all part the process of fragmenting organic space and producing abstract space. This view of abstract space production will inform the review of the history of cartography and GIS that comprise the following chapter.

Lefebvre (1991) traced the history of the rise of abstract space at the expense of social space. McCann argues two major maneuvers facilitate this process. First, the elite define "the appropriate meaning of, and suitable activities that can take place within, abstract space" (McCann 1999: 169) Second, the abstract space is rendered ahistorical and any traces of the "social struggles around its production" are vanquished (McCann 1999: 170). Both of these maneuvers will be demonstrated in the case study of this dissertation.

Space is Political

> Space is not a scientific object removed from ideology or politics; it has always been political and strategic. If space has an air of neutrality and indifference with regard to its contents and thus seems to be "purely" formal, the epitome of rational abstraction, it is precisely because it has already been occupied and used, and has already been the focus of past processes whose traces are not always evident in the landscape. Space has been shaped and molded from historical and natural elements, but this has been a political process. Space is political and ideological. It is a product literally filled with ideologies. (Lefebvre 1976: 31)

Harvey (1990: 226) credits Lefebvre with making the link between space and social control a central part of the contemporary discussion of social theory and geography:

We owe the idea that command over space is a fundamental and all pervasive source of

social power in and over everyday life to the persistent voice of Henri Lefebvre.

Lefebvre (1991) writes that state and capital are the chief agents of the production of abstract space. The maneuvers of state and capital seek to superimpose abstract space on social space. Such moves can evoke a clash between the current users of the space under contention and state and capital. Such a struggle which will be demonstrated in the case study, where "people fight not only over a piece of turf, but about the sort of reality that it constitutes" (Molotch 1993: 888).

For Lefebvre (1991: 417) the struggle over space (and reality) is of crucial importance since "space's investment – the production of space – has nothing incidental about it: it is a matter of life and death." With so much at stake and with state and capital having vast resources at their disposal, it would seem the people are doomed to continuing domination. But the people are not without hope:

> [The state's]… ability to intervene in space can and must be turned back against it, by grass-roots opposition, in the form of counter-plans and counter-projects designed to thwart strategies, plans and programmes imposed from above (Lefebvre 1991: 383).

The case study demonstrates how a grassroots organization deployed counter-mapping to challenge the production of abstract space by state and industry.

# Chapter 3

## The History of Cartography and GIS

This chapter reviews the history of cartography in the service of the state and traces the development of GIS. This review illustrates the state has used cartography as an instrument of power throughout history.

### History of Cartography in the Service of the State

> Cartography, we see, is never merely the drawing of maps: it is the making of worlds. (Harley 1990: 16)

This section reviews the history of cartography in the service of the state. The history of the relationship between cartography and state is reviewed in light of the theoretical perspectives suggested by Harley, Edney, and other writers who critique the empiricist approach to the history of cartography and explicate the role of power and politics in creating maps and in the use of maps.

Another theoretical perspective deployed is from the work of Henri Lefebvre as discussed in the previous chapter. The Lefebvrian notion of the state superimposing abstract space onto social space is deployed to shed a different light on the role of cartography in state power.

Examples from the history of Western cartography are reviewed to illustrate the above points. While the state has made use of cartography for military purposes, that aspect will not be treated in this dissertation.

#### Theoretical Perspectives on the History of Cartography

Recent scholarship in the history of cartography has emphasized the need for a more prominent role for theoretical considerations in the study of maps. A selection of this scholarship will be reviewed below.

Maps as Human Practice

Edney (1996) critiques empiricist approaches to the history of cartography which ignore or marginalize theoretical considerations. He writes (1996: 186):

> Traditionally, historians of cartography have not espoused theories about the nature of maps. They have not had to, because in modern society the nature of maps is self-evident.

Edney challenges the self-evident nature of maps and makes a case for explicitly incorporating theoretical considerations in the history of cartography.

Edney (1996: 185) contends that the atheoretical stance is untenable since "theories lie at the root of all empirical studies whether or not they are acknowledged." He argues for a new approach to the history of cartography. Edney (1996: 188) suggests scholars "de-naturalize the map." That is, scholars need to strip away the "self-evident" nature of the map. A goal of this new approach is "expose and then to study the map for what it is: a human practice" (Edney 1996: 188).

Harley (2001: 79) made a case for moving "away from a history of maps as a record of the cartographer's intention and technical acts to one which locates the cartographic image in a social world."

Edney (1996: 188) states that our culture has ensconced maps with a "shell of objectivity." Harley also critiqued the unwarranted objectivity and privileged status afforded maps. Harley (2001: 63) writes that the notion that maps could produce an unbiased representation of the world "is a view well embedded in our cultural mythology."

Black (1997: 9 - 10), like Harley and Edney, critiques the "self-evident" nature of maps that our society in general have ascribed to maps: "Most users rely on the apparent accuracy and objectivity of maps; they do not see the very process of mapping as political."

Edney (1996: 9 - 10) calls for a break through this unwarranted “shell of objectivity” and study mapping as a human practice accords with the critical theorist's call to situate knowledge production in society (Calhoun and Karaganis 2001: 181):

> Indeed, a central point of critical theory is that all scientific work is located inside society, not outside. Some social scientists pretend that their standpoints, histories, bases in social institutions and political engagements don't matter, but critical theory suggests that this is never altogether true. The task for social science is not to cut itself all from society, but to make explicit and criticizable the social basis on which it stands.

Critical theory argues that the social sciences are a human practice. Edney situates the history of cartography as another human practice. The implications of this move will be discussed below.

J.B. Harley (1932 –1991) exemplified the approach to history of cartography as human practice. Harley left a substantial body of work that critiqued maps as instruments of political power and made the social basis of mapping practices explicit and criticizable.

In his seminal paper, **“**Maps, knowledge, and power”, Harley (2001: 52-53) explicitly interrogated maps in “the context of political power” and “as a manipulated form of knowledge.” For Harley (2001: 53), maps are neither “inert records” nor “passive reflections” of the world. Rather, maps are active: “structuring the human world which is biased towards, promoted by, and exerts influence upon particular sets of social relations” (2001: 57). Harley (2001: 57) contended that the influence of maps on social relations typically served the interest of the privileged, asserting that “cartography's role in the transaction of power relations usually favored social elites.”

Black too points out the active role of power in the construction of cartographic knowledge. Black (1997: 10) notes that political interests are actively deployed through mapping practices: “Maps do more than record such interest, because mapping is central to

attempts to advance, recording contest understandings of space and spatiality." Maps are an active part of political agendas.

Black (1997: 9) asserts that the relationship between cartography, power, politics and the state can be traced back to the origins of cartography:

> That many maps treat of politics is readily apparent; this was true from the outset of cartography. There was a close connection in the ancient world between mapmaking and imperial conquest and rule, between what purported to the world maps and pretensions to world power.

Black notes that the relation between political power and cartography is currently important as well. As has been discussed above, Black (1997: 9) notes that "maps are used both to assert territorial claims and to settle them, especially frontier disputes." Black pointed out that the power of cartography in the service of the state is currently being exerted in just such a manner in the conflicts between Palestine and Israel and between India and Pakistan.

Mapping State Power Across Scales

Harley (2001: 57) notes that the power and influence of maps operate across a broad spectrum of geographical scales, "from global empire building, to the preservation of the nation state, to the local assertion of individual property rights." The structure below follows the structure of Harley's paper.

On the global scale, Harley says that maps have played important, active roles in empire building. Comparing maps to actual war material, Harley (2001: 57) asserts that "as much as guns and warships, maps have been the weapons of imperialism." Maps also served imperialism in a kind of public relations role. Depicting European colonial [or imperial] claims in cartographic form was an attempt to "legitimize the reality of conquest and empire" (Harley 2001: 57).

Burnett (2000) illustrated how cartography served the British state in securing the

colony of British Guiana. Burnett (2000: 3) recounts how "scientific explorations and cartographic surveys turned a region to Europeans called terra incognita into a mapped and bound colony." Burnett (2000: 6) lists a number of ways mapping practices contributed to the interests of European powers:

> by ordering chaotic spaces maps created imperial places; by making distant places visible they satisfied the scopic and gnostic drives of a conquering people; by abetting territorial control and practical ways and made colonies into large-scale Benthamite panopticons; by providing a textual based map that enabled European nations to inscribe their ambitions on inaccessible places; by making places portable they conformed to (and even exemplified) the Latourian notion of the immutable mobile. Their collation, storage, and maintenance made them particularly good instances of the texts that composed the imperial archive.

This list from the mapping practices in this case places cartography squarely in the service of the imperialist state.

Further support of imperialism came from maps which were deployed to support "legal" claims. After extracting treaties and other land deals from colonized territories, the imperial powers made maps depicting the spatial extent of the claims. Such documents became powerful images of legitimacy: "these maps more than often acquired the force of law in the landscape" (Harley 2001: 59).

The "imperial cartography" of John Dee provides an excellent example of cartography used to legitimize imperial claims. Sherman (1998) reviews the role of John Dee (1527 – 1609) and maps in the construction of the British Empire. Dee made numerous contributions to the expansion and maintenance of the British Empire. Indeed, Sherman (1998: 2-3) writes that Dee is "traditionally credited with coining the very term 'British Empire'." Sherman (1998: 1) asserts that cartography was an important tool in Dee's work: "Dee's mappings ... brought together advanced science and sophisticated rhetoric, and played an important role in the genesis of the British Empire."

Dee's most important work spanned four decades, from the 1550s to the 1590s (Sherman 1998: 2). During this period, he produced "a series of conferences, treatises, and maps" that supported "an expansionist program that he called the 'British discovery and recovery enterprise' " (Sherman 1998: 2-3). Through these maneuvers, Dee eventually "claimed for the Queen a vast dominion covering most of the water and much of the land in the Northern Hemisphere" (Sherman 1998: 3).

Sherman (1998: 3) calls Dee's deployment of mapping in the service of the British Empire "imperial cartography." Sherman (1998: 3) asserts that Dee "used cartography as a rhetorical tool to persuade the English government and its potential competitors of the legitimacy and feasibility of his imperialistic designs."

Harley (2001: 58) posited another, more abstract role for mapping in imperialist maneuvers:

> The graphic nature of the map gave its imperial users an arbitrary power that was easily divorced from the social responsibilities and consequences of its exercise. The world could be carved up on paper.

This view is very much in accord with Lefebvre's discussion on the state production of fragmented, abstract space to further its own agenda as noted in the previous chapter.

Harley (2001: 81) depicted mapping as a technique to facilitate the process Lefebvre referred to as the state and capital superimposing abstract space over social space: "Maps as an impersonal type of knowledge tend to 'desocialize' the territory they represent. They foster the notion of a socially empty space." Harley, in this case, was positing these mapping practices as a tool of imperialism.

At the scale of the nation-state, the role of mapping is also important. According to Harley, mapping is closely linked with the nation-state. So much so that Harley (2001: 59)

posits that “The history of the map is inextricably linked to the rise of the nation-state in the modern world.” The role of maps in supporting state functions was such that “Maps entered the law, were attached to ordinances, acquired an aureole of science, and helped create an ethic and virtue of ever more precise definition” (Harley 2001: 60). This tightly coupled relationship between state and cartography continues with the state serving as “a principal patron of cartographic activity in many countries” (Harley 2001: 59).

France provides a good illustration of the historic link between the nation-state and cartography. Pelletier (1998) reviews the role of cartography in the service of the state in France during the reigns of Louis the 14th and Louis the 15th. Pelletier (1998: 42) writes that the reign of Louis 14th gave rise to “the beginning of scientific cartography.” Among the characteristics Pelletier notes as scientific cartography are the accurate calculation of longitude for the first time and triangulation of the entire kingdom.

Pelletier (1998: 41) considers the triangulation of France to have been instrumental in erasing (or least suppressing) local distinctiveness and yielding “a concept of landscape in the modern sense, measurable in comprehensible terms which were as much technological as economic.” Pelletier (1998: 44) asserts that mid-seventeenth century European cartography was deployed by states as part of moves to assert “the symbolic domination of the world” noting that “Royal propaganda did not fail to draw upon the power of images.” Pelletier (1998) concludes the paper asserting that maps serve two important functions for the state: 1) they support territorial claims; and 2) they serve as administrative tools.

Mapping plays an important role at the scale of property rights. Harley (2001: 60) notes the role cadastral maps in promulgating state power. He writes that in ancient Rome the codified practices of the agrimensores may be interpreted not just as technical manuals of land

division in a theoretical sense but also as a social apparatus for legally regulating appropriated lands and for exacting taxation. Harley (2001: 60) situates these practices as the social relations between the state and landowners on one hand and tenants or peasants on the other.

Pottage (1994: 363) also describes cadastral mapping in terms of impacts on social relations and further implies the Lefebvrian concept of abstract space and the instrumental rationality that produces it:

> Registration extricated land from the network of relations and understandings which formed the "local knowledge" of different communities, relocated it on an abstract geometric map, and deciphered it according to a highly conventionalised topographic code. This process marked a transformation of the idea of land in law: property ceased to be a contractual construct and became a bureaucratic artefact.

Space, as a "bureaucratic artefact" can be an object of state administration. The "abstract geometric map" is a grid of state control and deciphering the space "according to a highly conventionalised topographic code" are the operations of state sponsored instrumental reason. The operations of state sponsored instrumental reason will be seen to play a significant role in the case study of this dissertation.

Moyer and Niemann (1998) trace cadastral mapping back to ancient Egypt. The ancient Egyptians developed these mapping practices to reestablish farm plot boundaries following the annual flooding of the Nile River.

Kain and Baigent (1992) have written an exhaustive study on the rise of cadastral mapping in Western Europe over four centuries. Kain and Baigent (1992: xviii) "view cadastral maps as instruments for effecting state policies with respect to land the property and for exerting political and economic control over land." The authors (Kain and Baigent 1992) mark the 16$^{th}$ and 17$^{th}$ centuries as a turning point in the use of cadastral maps. During this time frame "there was a fundamental shift in the development of cadastral maps from their uses as

inventories of private land toward their use by public authorities and ultimately state governments" (1992: 8). This trend continued and spread across Europe. By the 19th century the cadastral map was a "valued instrument of government land management" (Kain and Baigent 1992: 8). Kain and Baigent (1992: 8) assert that this part of the story is well known:

> What is less well-known is that in the early modern period the cadastral map was a highly contentious instrument for the extension and consolidation of power, not just to the propertied individual, but of the nation-state and the capitalist system which underlies it.

This is not to say that cadastral mapping is only practiced in capitalist nation-states. For example, Kain and Baigent note that cadastral maps were used in the Roman Empire. The authors' explanation is that cadastral mapping was "rediscovered" and deployed by "those in whose interest it was to consolidate capitalist developments" and "to further their own ends invest the ends of capitalism itself" (Kain and Baigent 1992: 119). Kain and Baigent (1992: 344) conclude, "It is thus power -- whether economic, social, or political -- which lies at the heart of the history of cadastral mapping."

Mapping Serves the Status Quo

In Harley's (2001) account, maps have historically typically served the interests of the state, institutions and powerful individuals. He finds few examples of maps that challenge the status quo or powerful interests. As Harley (2001: 79) succinctly put it "Maps are preeminently the language of power, not of protest." Harley (2001: 79) asserts that:

> Though we have entered the age of mass communication by maps, the means of cartographic production, whether commercial or official, is still largely controlled by dominate groups.

Contrary to some of the more utopian assertions by vendors and pundits of the almost inherently liberating qualities of information technologies, Harley (2001: 79) contends that "Indeed, computer technology has increased this concentration of media power." Harley

(2001: 79) saw the power of mapping remaining in the hands of the state and other elite: "Cartography remains a technological discourse, reifying power, reinforcing the status quo, and freezing social interaction within chartered lines."

Mapping Can Serve Other Interests

While Harley viewed mapping as an instrument of the powerful, recent projects are emphasizing the emancipatory potential of cartography. Doug Aberley has assembled a collection of papers that aim to put the power of mapping in the hands of the people. His book, Boundaries of Home: Mapping for Local Empowerment (1993) is replete with examples of how cartography can aid grassroots organizations in presenting their views on local development projects. The Public Participation GIS (PPGIS) movement has worked to redress the historic power imbalances previously so common place in mapping. This is discussed in more detail below.

## History and Social Role of GIS

This section traces the development of GIS with emphasis on the social implications of the field. Early conceptions of GIS positioned the technology as mainly a technical apparatus with an almost incidental organizational context. More recent notions of GIS highlight the social implications of the cluster of technologies and disciplines that now comprise this field.

Conceiving GIS

Burroughs (1987) produced one of the first texts on GIS. His early work exemplifies the technical apparatus conception of the field. He characterized GIS as a powerful set of tools for collecting, storing, retrieving at will, transforming, and displaying spatial data from the real world for a particular set of purposes (Burroughs 1987: 6). Burroughs (1987: 10) notes that along with the technical components of the machines, "the GIS needs to be placed in an

appropriate organizational context" to be effective. Burroughs (1987: 10) elaborates but a little on "an appropriate organizational context." He notes the importance of trained personnel, good management, and adequate funding. He makes no mention of the nature of the organization itself. He did not have to, in 1987 it was generally understood that the only organizations that would have this technology were well-funded governmental, academic, or private sector institutions. Burroughs (1987: 170) did note that GIS could potentially have a major impact on an organization, but his chief concern seemed to be on workflow and budgeting. The potential societal impacts of GIS were not on the radar.

By 1995, Pickles and other scholars were developing a richer, more socially conscious conception of GIS. Pickles did not take the institutional context for GIS as a given and he explicitly addressed the role of GIS in society. Pickles (1995: 3) understood that:

> GIS … operates at several levels and the "GIS" refers to several distinct types of object: a research community that transcends disciplinary boundaries; an approach to geographical inquiry and spatial data handling; a series of technologies for collecting, manipulating, and representing spatial information; a way of thinking about spatial data; a commodified object that has monetary potential and value; and a technical tool that has strategic value.

More recently, Harvey and Chrisman (2004) construed GIS as a social construct very much in accord with Edney's conception of cartography discussed above. Harvey and Chrisman (2004: 77) write: "Geography's technological artifacts are indeed inseparable from human activities, not only in a constructive sense, but intrinsically interwoven with our ideologies and politics." Harvey and Chrisman (2004) are situating GIS as a human practice.

The State and GIS

The state played an important formative role in the early development of GIS. Foresman (1998) notes the influence of governmental policy in both Canada and the U.S. on the diffusion of GIS use. In the U.S., Foresman (1998: 10) points to the National

Environmental Policy Act (NEPA) of 1970 as particularly important for:

> The nationalistic trend toward increased land use management and environmental protection that led to a plethora of mandated programs and both fostered and funded GIS technological development. NEPA has been recognized as the most significant motivating factor for the use of GIS technology by many federal agencies.

Other writers have similarly found strong links between GIS and the state. Moyer and Niemann (1998) reported on the influential role of the federal government supporting the development of Land Information Systems (LIS) which are GIS with parcel information. The authors also report on the wide range of uses of GIS at all levels of government (1998). Masser (1998) notes the key role of the state as a provider of essential data. He (1998: 1) writes "most operational applications of GIS are in some measure dependent upon the availability of data collected by government agencies." According to Masser (1998: 73), there are plenty of U.S. governmental agencies concerned with collecting geographic data of some type. In the U.S., Masser (1998: 73) estimates that approximately 80,000 governmental agencies at the local and county level "are involved in some way with geographic information creation." Warnecke (1998) also found that the Federal legislation played a role in the formation of GIS practices. Warnecke (1998: 273) writes: "Federal legislation not only provided strong incentives for planning efforts among federal agencies but also influenced state and local practices." Warnecke (1998) also points out the significance of NEPA as well as the Coastal Zone Management Act of 1972 and the Water Pollution Control Act Amendments of 1972 as important policies influencing the use of GIS by the states.

At state level of U.S. government, Cornwell (1982) reports that the precursors to GIS had been adopted as early as the 1960s to administer state natural resources by some states and local governments. Also focusing on the state level, Warnecke (1998) tracks the diffusion of GIS in state governments across the decades of the 1960s to the 1990s. Warnecke (1998: 270)

reports that “By the 1990s, GIS were used to some extent by all states. In addition, it was the first decade with GIS applied in virtually all functions of government.” Warnecke (1998: 287) concludes her paper asserting the thorough integration of GIS with state government functions: “Institutionalized approaches have been evolving through the decades in various ways. As a result, the 1990s can be thought of as the decade of GIS institutionalization.”

The role of government in GIS development continues in the new millennium. The National Research Council (2003) issued a report, Weaving a National Map, supporting the United States Geologic Survey’s (USGS) proposal for a constructing a spatial database to integrate “locally held spatial data sets. The USGS would be, in other words, the agency responsible for managing the placement of localized data into a common reference frame.”

Critical Assessments of GIS

Starting in the late 1980s some human geographers began criticizing the GIS field. Schuurman (2004) cites the first published evidence of tension between human geographers and GIS practitioners as Terry Jordan’s piece in the AAG newsletter in 1988. Jordan, then president of the AAG, criticized GIS for lacking intellectual substance. A contentious debate ensued that appeared as a series of articles in the early to mid 1990s in the *Political Geography Quarterly* (Taylor 1990, Goodchild 1991) and in of *Environment and Planning A* (Taylor and Overton 1991, Openshaw 1991, Openshaw 1992, Sheppard 1995). See Schuurman (2000 and 2004) for a detailed account of this debate.

The gist of the debate centered on the assertion from human geographers that GIS was, in the main, a reworking of the “quantitative revolution” and that GIS practitioners were ignoring some of the important philosophical and theoretical developments that have taken place since the quantitative revolution. For example, Pickles (1995: 18) commented that:

> While it is certainly the case that many critical theorists in geography see in GIS a rehabilitation of positivist epistemology, from a different perspective it is clear that positivism was never forsworn, nor was the critique of positivism seriously engaged by GIS scholars.

GIS practitioners responded that the field was more than mere quantitative techniques with graphics and that the field posed significant and distinct intellectual questions.

Pickles, in many ways, has lead the critique of GIS. His (1995) edited volume, Ground Truth, is a collection of papers that raise numerous questions about the social implications of the GIS and related technologies. In his paper in the book, Pickles (1995: 11) poses the question: "Can we transform GIS and other imaging technologies to make them compatible with the premises and commitments of critical science?"

In the history of cartography section of this chapter, Edney found that maps have been naturalized in our society. Similarly, Pickles (1995: 23) finds that for GIS practitioners, their "concepts, practices, and institutional linkages remain largely unproblematized, naturalized as normal and reasonable ways to thinking and acting."

Public Participation GIS

More recent research investigates the social impact of GIS as practiced by governmental, academic, and private institutions. In addition, alternative GIS practices are under development to reach groups and institutions that have not previously had access to these technologies. Much of this work is taking place under the rubric of Public Participation GIS (PPGIS).

The National Center for Geographic Information and Analysis (NCGIA) has undertaken an initiative: *Empowerment, Marginalization and Public Participation GIS*. The project is "concerned with the social, political, historical, and technological conditions in which GIS both empowers and marginalizes individuals and communities" (NCGIA). Craig, et al. (1999)

compiled an extensive report on a workshop held in 1998 to further develop the PPGIS project. Among the goals of the workshop, one of the "critical objectives was to understand the social context in which PPGIS are developed and implemented and the social impacts of its use" (Craig, et al. 1999: n.p.).

Twenty-eight of the papers presented at the workshop were revised and published in 2002 (Craig, et al. 2002). The first chapter (Weiner, et al. 2002) in the volume list six core concerns of PPGIS:

1. differential access to geographic information and technology,
2. integration and representation of multiple realities of landscape within a GIS,
3. identification of the potential beneficiaries of participation GIS projects,
4. development of place-based methodologies and methods for more inclusive community participation spatial decision-making,
5. situating of PPGIS production and implementation in its local political context, and
6. identification of community GIS contributions to geography and GIScience.

The core concerns of PPGIS illustrate a significantly different conception of GIS from the conception exemplified by Burroughs. For Burroughs (1987), the institutional context and social impact of GIS were unproblematic. PPGIS aims to critically assess these very factors.

PPGIS is further distinguished from early GIS by an explicit advocacy orientation. Craig et al. (2002: 368) write:

> PPGIS is purposefully value-laden and redefines the meaning of 'accuracy'. Its objective is to include 'peoples' maps and narratives to more fully understand complex socio-economic, cultural and political landscapes.

The authors (Craig et al. 2002: 368) go on to write:

> The digital countermapping of PPGIS tells the spatial stories of marginalized people and communities. Whether this can be translated into real power and political influence remains to be seen.

This move to marshal GIS to tell the "spatial stories of marginalized people and communities" and to explore issues of translating spatial knowledge into improved material

conditions for this constituency aligns PPGIS, in my view, with many of the aims of critical geography reviewed above. As cited in Chapter 2, Gregory (1994: 76) states “I hope that critical human geography can help to make social life not only intelligible but also *better*.”

# Chapter 4

## Environmental Justice

> Today more than ever, the class struggle is inscribed in space. Indeed, it is that struggle alone which prevents abstract space from taking over the whole planet and papering over all differences. … The forms of the class struggle are now far more varied than formerly. Naturally, they include the political action of minorities. Lefebvre (1991: 55 emphasis added)

This chapter reviews a selection of literature on environmental justice. First, I define environmental justice and review some background on the topic. Next, I review research on environmental justice and GIS. This review illustrates the myriad methodologies that have been deployed to assess environmental justice and notes how methodologies greatly impact results. Then, I present an overview of environmental justice studies in the Baton Rouge to New Orleans Mississippi River Corridor. Finally, literature treating the Shintech case is presented.

### Environmental Justice: Definition and Background

#### Defining Environmental Justice

Environmental justice is concerned with the disparate impact of environmental pollution on minorities and low-income groups. Williams (1999: 313) succinctly encapsulates the concerns of the environmental justice movement:

> The environmental justice movement argues that poorer people in general, and people of color in particular, face risks--from their proximity to hazardous facilities and waste sites--that are disproportionate to their numbers in the population.

This viewpoint, according to Williams (1999: 313), argues for an environmental movement that is "not simply about protecting nature from the ravages of industrial society." Rather than the simple struggle for natural beauty and protection of flora and fauna for the people with sufficient disposable income to visit such amenities, Williams (1999: 313 - 314) posits that "A

crucial goal of the environmental justice movement is to empower the affected communities so that they can work toward solving their specific environmental and health problems."

Robert Bullard, whom I have heard introduced as the "Godfather" of the environmental justice movement, defines environmental justice as (Bullard and Johnson 2000: 558):

> the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Therefore, environmental justice concerns equitable outcomes and the policies and processes to achieve those outcomes.

Susan Cutter (1995) compared the terms environmental justice and environmental equity. In Cutter's view (1995: 118), the environmental justice movement is chiefly concerned with the "differential enforcement of environmental protection statutes." Environmental equity, on the other hand, "implies an equal sharing of risk burdens, not an overall reduction in the burdens themselves" (Cutter 1995: 112).

The Origins of the Environmental Justice Movement

The environmental justice movement, as we know it today, began in the late 1970s and early 1980s. Bullard and Johnson (2000: 556) cite a 1979 lawsuit, Bean v. Southwestern Waste Management, Inc., as "the first of its kind to challenge the siting of a waste facility under civil rights law." This suit was filed by African American residents of a suburban middle class neighborhood to stop a landfill from being built in their community.

Another important episode in the environmental justice movement and, by many accounts, the case that first garnered national attention, began in the fall of 1982 in Warren county, North Carolina. In this case, a rural African American community was resisting a hazardous waste landfill. The effort to block the landfill failed. However, the struggle is

widely credited as the start of the environmental justice movement. Chavis (1993: 3) writes "Warren County is important because activities there set off the national environmental justice movement." Bullard (1994: 5-6) likewise notes the importance of Warren County: "The protests marked the first time African Americans had mobilized a national broad-based group to oppose what they defined as environmental racism." McGurty (2000: 374) affords a prominent place in the history of the environmental justice movement to this struggle asserting that "the legacy of the events in Warren County and the meanings that are derived from these events are central to understanding the contemporary environmental justice policy discussion."

Background on Environmental Justice in the EPA

In 1994, President Clinton signed Executive Order 12898 requiring all Federal agencies to integrate environmental justice goals into each agency's mission. This order, entitled *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, directed all Federal agencies (Clinton 1994):

> To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

The EPA's Environmental Justice Strategy has established the following goals to operationalize this Executive Order (U.S.EPA 1995):

> No segment of the population, regardless of race, color, national origin, or income, as a result of EPA's policies, programs, and activities, suffers disproportionately from adverse human health or environmental effects, and all people live in clean, healthy, and sustainable communities.
>
> Those who live with environmental decisions -- community residents, State, Tribal, and local governments, environmental groups, businesses -- must have every opportunity for

> public participation in the making of those decisions. An informed and involved community is a necessary and integral part of the process to protect the environment.

The EPA stated that one mechanism for the implementation of its Environmental Justice Strategy is through a new policy invoking Title VI of the Civil Rights Act of 1964 (U.S.EPA 1995). The case study of this dissertation stems from a grassroots organization invoking this Title VI policy.

**Environmental Justice Methodologies**

This section examines some methodological issues concerning environmental justice studies. Two review papers, McMaster, et al. (1997) and Maantay (2002), systematically explicate the numerous methodologies, variables, and scales that have been used in selected environmental justice studies. A paper by Williams (1999) discusses theoretical and practical considerations of operationalizing the concept of community in the context of environmental justice studies. These papers are reviewed with an eye to how they reveal the importance of categories of analysis, methodologies, variables, and scales in the social construction of environmental justice and geographical knowledge.

The review of these papers serves to outline the major contours of this discussion. In accord with the authors of these papers, I believe that questions on the use of methodologies, data, and scales in environmental justice studies will be debated for years to come. For example, McMaster et al. (1997: 175) writes:

> despite a decade of work in applying GIS to the assessment of environmental risk in general, and environmental equity specifically, there is little consensus on the most appropriate methodologies for obtaining consistent and replicable results.

McMaster et al. (1997: 176-177) provides an apt illustration of this lack of methodological consensus. The authors produced a table comparing seven environmental justice and environmental risk studies from 1990 to 1997. Their table lists five main categories

with a total of 46 variables and 3 different analysis methods. I have produced a table (Table 2) below to summarize McMaster et al.'s table.

Table 2. Summary of McMaster et al. Table.

| Category | Number of Variables/Approaches |
|---|---|
| Census Data | 29 Variables |
| Hazardous Materials | 8 Variables |
| Geographic Scale | 4 Variables |
| Data Resolution | 5 Variables |
| Analysis Method | 3 Approaches |

Maantay conducted a similar review of environmental justice studies. Maantay (2002: 162) reviewed thirteen studies spanning from 1993 to 1999. Maantay uses eight categories to summarize the findings, methodologies, and data used in the studies.

The eight categories used to summarize the studies are:

1. Type of environmental hazard
2. Scale (geographic extent of study)
3. Resolution (geographic unit of analysis)
4. Spatial coincidence method used
5. Proximity analysis used
6. Exposure index used
7. Dispersion modeling used
8. Disproportionate burdens found?

Along with illustrating the diversity of approaches to environmental justice and environmental risk studies, McMaster et al. (1997: 172) points to the impact of methodologies on study findings:

> We illustrate the complexity of the relationship between methodological approaches used and the resulting assessments of environmental equity and risk, even within a single study area.

So, the numerous approaches deployed are significant in the findings of disparate impact on minorities or not. The way the questions are posed impacts the answers.

Williams (1999) also found that results of environmental justice investigations varied as research approaches differed. McMaster and Maantay reviewed a host of variables and categories that influence study results. Williams likewise noted that a variety of variables have been employed in various studies but focused on the myriad ways of defining the unit of analysis. Williams (1999: 313) found in his review that defining and operationalizing the suitable unit of analysis had important impact on research findings:

> Crucial to their empirical studies is the operational definition of "community" as a unit of analysis. Different operationalizations of community exist, leading to divergent conclusions about the extent of the problem.

Williams (1999: 313) delineates three general approaches to framing "community" as a unit of analysis:

1. as a neighborhood (a place of cultural identity);
2. as part of a political jurisdiction (county, city, etc.); and
3. as approximated by data constructs (like zip code areas and census tracts).

As I will describe in the case study chapter, my approach to framing the community as a geographical unit of analysis bears a resemblance to (1) community as neighborhood. I asked the SJCJE about their concerns and then I constructed maps to address those concerns. I did not start with a political boundary or administrative unit as the sacrosanct geographical unit of analysis.

Williams (1999) notes that data collected based on census units or other administrative units may not coincide with a community's borders. Communities are also dynamic and their changes in form and composition may outpace data collection. For example, the racial

composition and/or economic status of an area may change significantly between the censuses. Also, census units sizes and shapes are periodically changed to suit the needs of the U.S. Census Bureau which may have no relation to "communities as neighborhoods" or other community concerns.

Williams (1999) reviewed four studies that utilized different units of analysis. Williams, like McMaster et al. (1997) and Maantay (2002), found that the methodology deployed, in this case the units of analysis, had an impact on the findings in the respective environmental justice studies. Williams (1999: 313) then addressed the question of the likelihood a consensus could be reached on the one best unit of analysis for environmental justice studies:

> Given the various goals of EJ researchers, we probably cannot reach a consensus on one common definition of an analytical unit. Indeed, it can be argued that several operational definitions are needed for methodological and normative reasons. Methodologically, we gain much insight into both risk and discrimination by employing multiple analytical units.

When deployed by researchers who "assist, rather than lead" multiple analytical units "permit those affected by the hazards to define the units that they consider important to study" (Williams 1999: 313).

My approach to mapping for the SJCJE, which pre-dates Williams' article, illustrates the concept of "assist, rather than lead." Also, I specifically asked the SJCJE what they would like to be the focus of my maps. In this manner, the SJCJE defined "the units that they consider important to study."

I took an approach similar to Williams' description in my case study. I asked the SJCJE what they would like to make the focus of my study and I developed alternative units of analysis accordingly. These units of analysis serve as a social space complement to the instrumental space, abstract space units of analysis approach of state and industry.

Williams (1999: 323) points out a potential problem with a flexible approach to defining the units of analysis:

> …studies might yield incomparable findings. As a result, the research findings will not be generalizable at similar scales of analysis; a fortiori, they may raise as many questions as they answer. Are environmental inequities really a national problem, or only localized to particular spots? The disparate analytical units will continue to fuel the social science debates.

In my opinion, the environmental justice struggles will be waged primarily on the local front for the next several years. Perhaps after a critical mass of struggles and studies, popular and political opinion may begin to conceive of environmental justice as a national problem. However, there will probably always be areas that not do fit the patterns of discrimination that have been uncovered in other areas of the country.

Williams (1999: 323) noted some possible practical political consequences of flexibility in using differing units of analysis:

> Some politicians and advocates from different ideological camps could make political capital by focusing on the research that reinforces their point of view. Although those consequences probably cannot be avoided, we at least can be aware that our choice of a particular analytical unit will have political ramifications.

I certainly agree that political ramifications will accompany the choices of units of analysis, along with choices among the wide variety of other variables that have been reviewed in McMaster et al. (1997) and Maantay (2002). Unlike Williams, I am not convinced that that is a bad thing. I am interested in empowering communities through defining alternative units of analysis and by reframing the discussion of environmental justice (in broad sense) from abstract space to social space.

While Williams is concerned with how the community is operationally defined, he still assumes a facility-oriented study. Research questions continue to be formulated in terms of how the community is defined in proximity to the facilities, rather than how facilities are

assembled around the community. The difference between facility-oriented and community-oriented approaches to environmental justice studies is a significant part of my case study and I will elaborate on this topic in that chapter. This is not a question of semantics or just of perspective. The community-oriented or facility-oriented position will be shown to have significant consequences for the kinds of questions that can be asked and the type of space that is produced (abstract space or social space). Furthermore, I believe that the difference between facility-oriented and community-oriented will have significant consequences for whose interest is best represented by a particular mapping method.

Williams' position on the political ramifications of environmental justice methodologies is also in accord with critical theory's emphasis on social science being part of, a participant in, society – not somehow apart from it. Also, this shows the role of categories and methodologies impacting the outcomes of studies.

Williams takes it as axiomatic that social science research is not completely objective or value free. He is also cognizant of the role of the methodological choices the researcher makes in impacting the outcome of any study. While Williams (1999: 325) contends these are inherent in social science research, he asserts that social science researchers can ameliorate the negative impacts of these constraints by clearly stating their theoretical assumptions and are "scrupulously honest in conducting the research."

The work by Neumann et al. (1998) is of particular importance because it is the only study I have found that offers an alternative to facility-oriented studies. Every other study that I have read uses the facilities (of whatever variety) as the focal point of any mapping or analysis. In Neumann's study, census blocks are used as the point of origin to generate a buffer to quantify the pollution around the census blocks. All other studies use facilities as the point of

origin to generate a buffer to add up the population around the facilities. Neumann et al. (1998) also uses this facility-oriented methodology.

This study claims to be "the first study to combine hazard screening, demographic analysis, and GIS technology to address environmental equity issues surrounding Toxic Release Inventory (TRI) facilities" (Neumann et al. 1998: 218). TRI facilities refer to the class of facilities that have to report to the EPA the estimated emissions of certain chemicals under the Emergency Planning Community Right-to-Know Act of 1986 (EPCRA). In Neumann's study, hazard screening refers to measures of relative toxicity of the emissions from TRI facilities.

Introducing the use of relative toxicity measures is an important step in environmental risk assessment and environmental justice studies. However, for this dissertation, the importance of Neumann's study is that this is the only study I have found in my extensive literature review that offers an alternative to the facility-oriented approach. That is, Neumann's paper (1998: 219) utilizes census blocks as the focal point of analysis and examines the level of pollution released around the census blocks: "In alternate geographic analysis, 1.0 mile circular radii were drawn around the centroid of individual census blocks rather than around each TRI facility…" Then, measures of relative toxicity "were aggregated from all TRI facilities falling within 1.0 mile of each census block centroid" (Neumann et al. 1998: 219). The authors (1998: 219) go on to explain that this approach was "desirable in urban and industrial areas where there may be multiple sources of environmental pollutants close to residential areas." Neumann did not publish a map illustrating this alternative approach. This method was used strictly for analysis (Neumann et al. 1998).

**Environmental Justice in the Corridor**

The stretch of the Mississippi River from Baton Rouge to New Orleans is referred to by different names. The name used to identify this region can indicate political affiliations. Allen (2003: 28) reports:

> The [Louisiana state] government proudly refers to the region as the Industrial Corridor, a glowing success story of industrialization in the state. Company representatives often call it the Chemical Corridor, laying claim as one of the region's most powerful political constituents. Many current residents, however, call it Cancer Alley, referring to the multitude of health problems its citizens face on a daily basis. People speaking at environmental justice hearings or in interviews can be readily identified with their political group simply by what they called the landscape.

While I agree with Allen's characterization of which groups use which term, I would not go so far as to *determine* an individual's political affiliation solely based on the choice of appellation. I would, however, say Allen has identified a useful heuristic. I will refer to this area as simply "the Corridor."

A number of environmental justice studies have been conducted in the Corridor. Adeola (1994), a sociologist, used a survey to examine attitudes toward hazardous waste and health in Baton Rouge. His study also found that African Americans were more likely to live near hazardous waste facilities than Whites. Wright et al. (1994) discusses some historic background on the development of the environmental justice movement in the Corridor. The authors recount several environmental justice struggles in many small, largely African American communities and call for greater commitment of resources to environmental cleanup and non-toxic economic development. Bullard (2000), in his book Dumping in Dixie, now in its third edition, reports on environmental justice struggles in numerous different locations in the Corridor, including the Shintech case that will be reviewed below. Bullard includes the Shintech case as an example of a successful working model of an environmental justice

struggle. See Bullard (2000) for other examples of successful environmental justice struggles in the Corridor.

There are also several studies that have included geographic analysis in assessing environmental justice. Lindsey (1996) mapped TRI facilities in the Corridor and created buffer zones around the facilities to assess the percentages of African American and white population within the zones. Lindsey (1996 n.p.) found that African Americans were "potentially more impacted by carcinogen emissions than other corridor residents." Perlin et al. (1999) used demographic data and proximity to TRI sites to assess environmental justice conditions in the Corridor. The authors (Perlin 1999: 29) determined that African Americans and people with incomes below the poverty line are more likely than Whites and people with incomes above the poverty line "to live closer to the nearest TRI facility and to live within two miles of multiple TRI facilities." Perlin et al. (2001) looked at the same area and this time included the demographic variable of children under the age of five. The findings from their previous study were similar to their findings with the new cohort, that is, poor African American children under the age of five were more likely to live closer to TRI facilities than White children under the age of five. Pine et al. (2002) studied thirteen chemical-processing sites in the Corridor. They used the EPA's Risk Management Plans to develop vulnerability zones illustrating potential off-site impacts from accidents around thirteen chemical-processing facilities in the corridor. The goal was to evaluate if African Americans were more likely to live closer to chemical-processing facilities than whites. The study concluded that race does matter: "The percentage of African Americans living near a chemical-processing site tends to be much higher when compared to population characteristics further from the site" (Pine et al. 2002: 317).

Roberts and Toffolon-Weiss (2001) address environmental justice in the state of Louisiana. The authors present a background chapter to establish the socio-political context of the environmental justice movement. Then, they review four case studies of environmental justice struggles. One of the cases is the Shintech struggle.

Markowitz and Rosner (2002) provide considerable historical background on environmental issues in the corridor as well as thoroughly documenting contemporary issues. Their work also includes sections specifically treating environmental justice in the Corridor, including a detailed account of the Shintech case. Markowitz and Rosner (2002: 264) also included one of my maps on the Shintech case in their book, albeit without the proper attribution.

Colten (2002) takes a historic look at environmental justice issues in New Orleans. Colten investigates the implementation of drainage system improvements between 1890 and 1930 in light of racial segregation policies in effect at the time. Colten found that by 1930, drainage services were delivered equitably.

Allen (2003) studied the rise of the environmental justice movement in the Corridor and takes a detailed look at the Shintech case. Allen is particularly interested in the strategies and tactics of grassroots environmental organizations to counter the machinations of state and industry. Allen's work made extensive use of interviews, fieldwork, and official documents. Allen critiques the deployment of science and economics on the part of state and industry. She juxtaposes the state's and industry's use of knowledge to further their agendas with the knowledge production of citizens and expert/activist in the service of environmental justice. Allen (2003: 147) also included a version of one my maps on Shintech in her work. She used my map as an example of using knowledge for the benefit of citizens.

## Environmental Justice and Shintech

In 1996, Shintech, Inc. proposed to build a 700 million-dollar polyvinyl chloride plant near the small town of Convent in St. James Parish, Louisiana. This proposal started a major struggle between local residents opposed to the facility and the Shintech Corporation. This struggle is the case study for this dissertation.

The local residents opposed to the proposed Shintech facility formed the St. James Citizens for Jobs and the Environment (SJCJE). The SJCJE sought help from the Louisiana Environmental Action Network (LEAN), a statewide grassroots environment group. I have been a member of LEAN for many years and have occasionally provided technical support to the group. As the proposed Shintech facility case became a full-fledged controversy with significant implications for the environmental justice movement, I decided to volunteer my technical services to the SJCJE to assist the group in presenting their concerns to government agencies, elected officials, and other interested parities. This dissertation is the product of an activist/scholar.

Kurtz (2000) and Allen (2003) provide two thoroughly detailed accounts of the Shintech struggle. Both works make extensive use of interviews with people intimately involved in the case and a variety of public documents.

Kurtz is a geographer and the Shintech struggle is the subject of her dissertation (2000). Her research interest in the case was the social construction of scale. She investigated how the various parties involved in the case attempted to frame the case in a manner more favorable to their respective interests. She interviewed a wide variety of the participants in the struggle from state government, chemical industry representatives, to the citizens who opposed the proposed Shintech facility.

Allen's study has been noted above. While the overall scope of her work is the environmental justice movement in the Corridor, the book includes considerable detail on the Shintech case. For Allen, the Shintech case is one example among several that illustrates the environmental justice movement in Louisiana. Allen uses these cases to build her arguments on the role of science in the service of the state and industry or the citizen-based science she advocates. Like Kurtz, Allen makes extensive use of public documents and interviews with principle parties.

A number of additional studies have focused on the Shintech case. Samples of these studies are noted below.

Block and Whitehead (1999) investigate the impacts of the EPA's environmental justice policy on minority populations. The authors contend that such policies may actually cause economic harm to the very populations the policies were designed to protect by discouraging economic development.

Hines (2001) presents an overview of the strategies deployed by the opponents of the Shintech plant. Hines traces the history of permitting process and outlines the legal maneuvers pursued by the Shintech opponents. The paper reviews the organizational strategies used by the local opposition to the proposed plant. The local opposition used education as a key strategy to build support for their cause was through educational efforts: "Environmental justice activists suggest that the most important step is to educate the public about its rights to a safe environment" (Hines 2001: 787).

Berry (2003) follows a similar tack as Hines in investigating the organizing and coalition forming strategies of the local opposition to the proposed Shintech facility. Berry (2003: 3) gleaned data from media archives to build a case that even a "small, oppressed, and

seemingly powerless community" can defeat the plans of a multinational chemical company that was supported by high ranking state governmental officials.

# Chapter 5

## Case Study: Mapping the Other Truth

This chapter critiques the mapping practices of state and industry in the Shintech case and presents my alternative approach. My critique of state and industry mapping practices and my alternative mapping practice are grounded in insights from critical theory, the work of Henri Lefebvre and the manifestations of these influences in geography which have been reviewed in the preceding chapters.

After this introduction, the study area of the case study is briefly characterized. Next, maps and materials produced by the EPA and Shintech are presented and critiqued. I then present my own approach to mapping environmental justice concerns, environmental risk assessments, and facility-siting issues to address the shortcomings of EPA and Shintech.

### Study Area

St. James Parish is located approximately halfway between Baton Rouge and New Orleans on the Mississippi River (Figure 1). The 1996 Louisiana Toxic Release Inventory states the parish had nine TRI facilities which released approximately 17.3 million pounds of TRI substances into the air, land, and water (DEQ 1996). The parish ranked third in total releases behind Ascension and Jefferson parishes.

In 1990, Louisiana's population was comprised of approximately 33 percent African Americans, while St. James Parish had approximately 49 percent African Americans (U.S. Census 1990).

From the point of view of the SJCJE, an important characteristic of St. James Parish environs is the high level of the existing toxic burden due to the pollution from the seventeen TRI facilities in St. James Parish and in the adjacent parishes of Ascension and St. John. The

SJCJE was particularly concerned that the proposed Shintech facility would be adding an additional toxic burden of vinyl chloride. Vinyl chloride (VC) is a *known* cancer-causing agent.

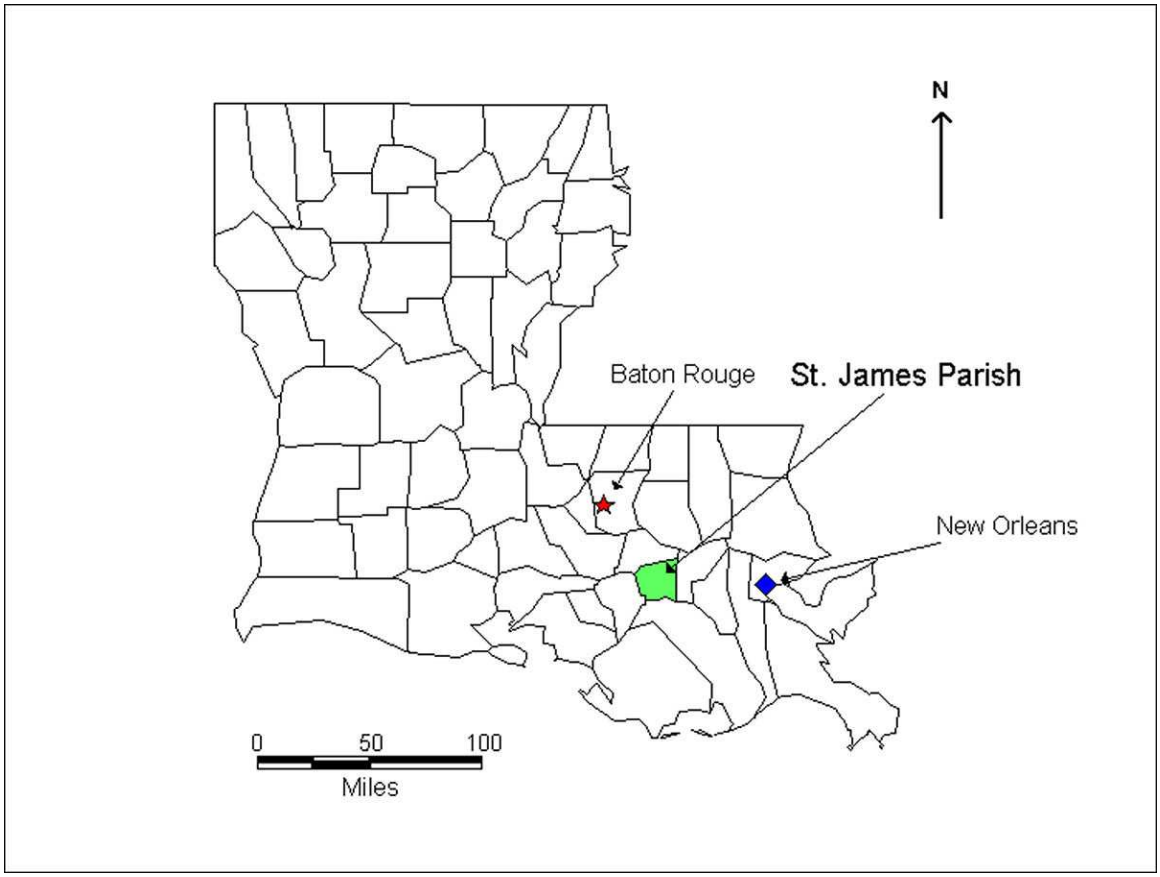


Figure 1. Study Area

The concerns of the SJCJE and others concerned with environmental health in St. James are pointedly validated by this EPA map (Figure 2) from 1996. The map depicts the estimated median exposure concentration of vinyl chloride in Louisiana, relative to the rest of the U.S. St. James Parish is in the 90$^{th}$ percentile for vinyl chloride exposure concentration in the U.S.

**Critical Analysis of Maps, Materials, and Methodologies from EPA and Shintech**

This section presents and critiques maps and materials from EPA and Shintech that were developed or collected as part of EPA's administrative duties and Shintech's efforts to

secure an operating permit. The EPA's materials are treated first, Shintech's materials are treated second.

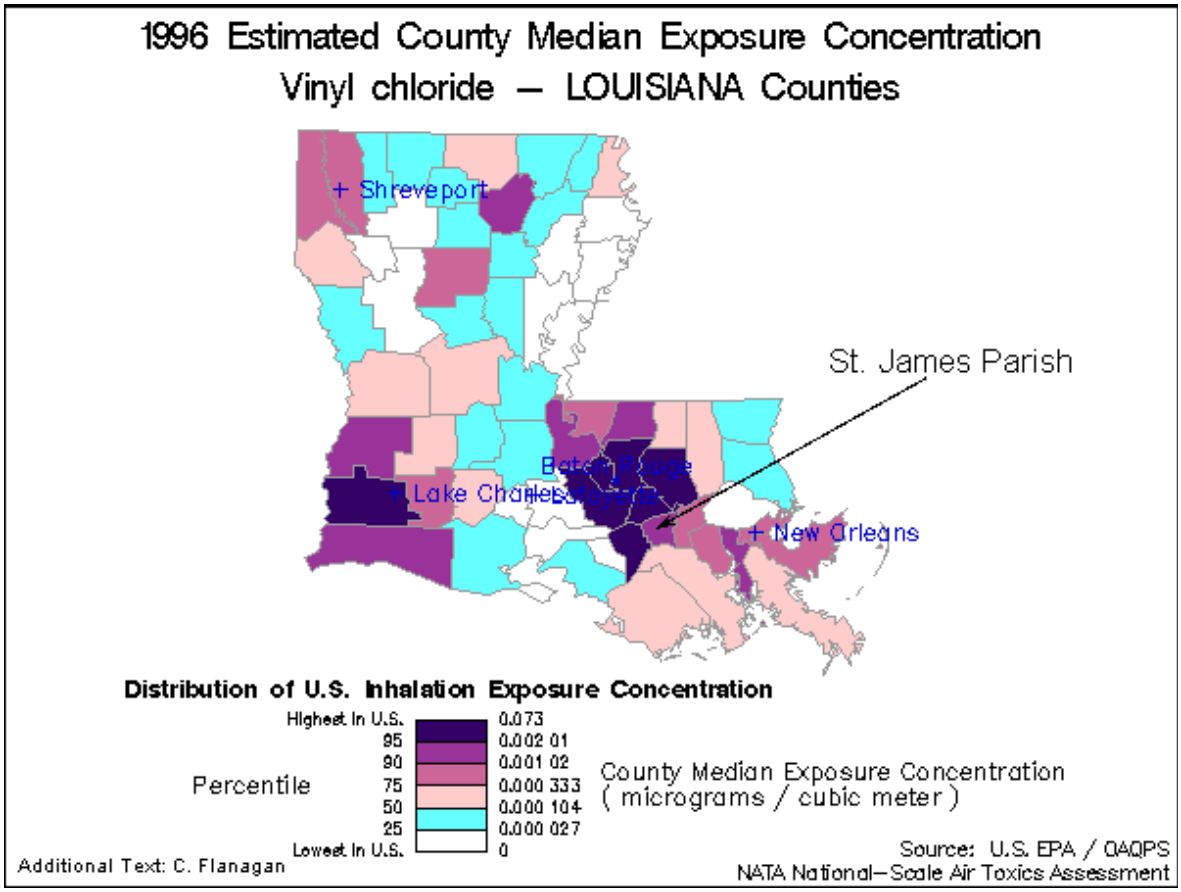


Figure 2. 1996 Estimated County Median Exposure Concentration Vinyl Chloride – Louisiana Counties

EPA

As noted in the introductory chapter, the EPA initiated an investigation into the DEQ's permitting procedures. The EPA maps and materials are from the demographic study conducted by the EPA in response to an Administrative Complaint filed with the EPA by the SJCJE, LEAN and other groups alleging violation of Title VI of the Civil Rights Act and EPA's Title VI regulations by DEQ. The EPA Office of Civil Rights agreed to investigate the complaint on August 8, 1997 (U.S.EPA 1998).

The EPA (1998: 2) conducted its investigation to determine if DEQ administers "their environmental programs in a manner that does not have a discriminatory effect based on race, color, or national origin." So, while the proposed Shintech facility in St. James Parish was the impetus for the complaint filed with EPA, the EPA study investigated the DEQ permitting process statewide.

The EPA's methodology was similar in several ways to many of the studies reviewed in the previous chapter. The agency used the typical combination of block level census data, TRI facilities, and GIS to conduct statistical analyses to calculate numerical values indicating conditions of environmental justice or environmental injustice in the study area (USEPA 1998).

The agency did not cite any studies to support their choice of methodology. Nonetheless, the EPA investigation incorporated many of the recommendations from the environmental justice studies reviewed in the previous chapter. For example, the agency created relative toxicity measures which normalized the toxic burden of the various chemical substances emitted from facilities and they calculated a normalized cumulative burden for census blocks in proximity to more than one facility (USEPA 1998: 21). Another recommendation implemented by the agency was to conduct analyses on different spatial scales. The EPA conducted analyses on four different spatial scales.

The EPA analyses did not include air dispersion modeling though their report indicates that they were planning to add this parameter (USEPA 1998: 23). The EPA investigation was suspended before this plan was implemented because Shintech withdrew their permit application for St. James Parish in September, 1998. Shintech opted to construct a much smaller facility approximately 45 miles upriver from the proposed St. James site in Iberville Parish.

EPA Mapping Methodology

The EPA mapping practices and analyses were facility-oriented. The EPA (1998: 3) report succinctly states their position:

> For this investigation, the Agency will continue to use proximity to facilities as an important point of departure in understanding facility impacts and the relative impacts from TRI emissions on African Americans and non-African Americans.

This facility-oriented practice will be contrasted with my community-oriented mapping practice in the section below entitled An Alternative Approach: Emancipatory Mapping.

The EPA produced fourteen maps and one diagram for their report. Every map produced by the EPA depicted the proposed Shintech facility as if it already existed. There is no indication whatsoever on the maps that the proposed facility was just that, a *proposed* facility. The text in the report in which the maps appeared was inconsistent in referring to the proposed facility as proposed or as if it existed (USEPA 1998).

Depicting the proposed Shintech facility as if it exists, on this map and every other map, is a serious error on the part of EPA. Depicting a 700 million-dollar chemical facility that did not exist then and does not exist now as if it does exist is indefensible on the most basic factual level. This error shows a low level of quality control and editorial oversight. On the other hand, this may have been an intentional act. For the purposes of my analysis, I will not assign intentions. I am concerned with the *effects* of mapping practice.

The EPA used two different ways to plot the location of the facilities treated in their study. One way was to plot the location of the facilities as a single point, "i.e., the longitude and latitude coordinate for the facility" (USEPA 1998: 8). The other way to plot the locations of the facilities was by the facilities' property boundary that they referred to as "polygons." The EPA (1998: 8) explained this move by asserting:

> … use of a facility polygon provides a more accurate representation of people living near the borders of facilities. Also, larger facilities may have several significant, but widely separated emissions points within their boundaries.

These two different means of plotting facility locations were used for both the statistical analyses conducted by EPA and for a number of the maps they produced. This became an important variable that impacted the EPA's findings of disparate impact.

This methodology is flawed. The problem with the EPA method is that several of the facility property boundaries are much larger than the actual facility structure. This is illustrated by the proposed Shintech facility. The proposed Shintech facility property is approximately 3700 acres and the actual facility structure was designed to occupy approximately 350 acres (Shintech 1997b).

EPA Maps

The EPA produced 14 maps for their investigation into DEQ's permitting process. The maps are described and critiqued below.

The EPA map, *St. James Parish, LA* (Figure 3), depicts 1) the existing facilities in St. James Parish and the facilities within four miles of the St. James Parish boundary, 2) the proposed Shintech facility, and 3) two facilities, American Iron Reduction and Louisiana Iron Works, which were under construction at the time this map was produced. The existing facilities in St. James Parish and the facilities within four miles of the St. James Parish boundary are depicted by the facility's property boundary. These polygons are a light green color fill.

The proposed Shintech facility is depicted similarly to the existing facilities. The proposed facility property is a slightly different shade of green. There is no explanation on the map to indicate that Shintech does not exist. The two facilities under construction are depicted

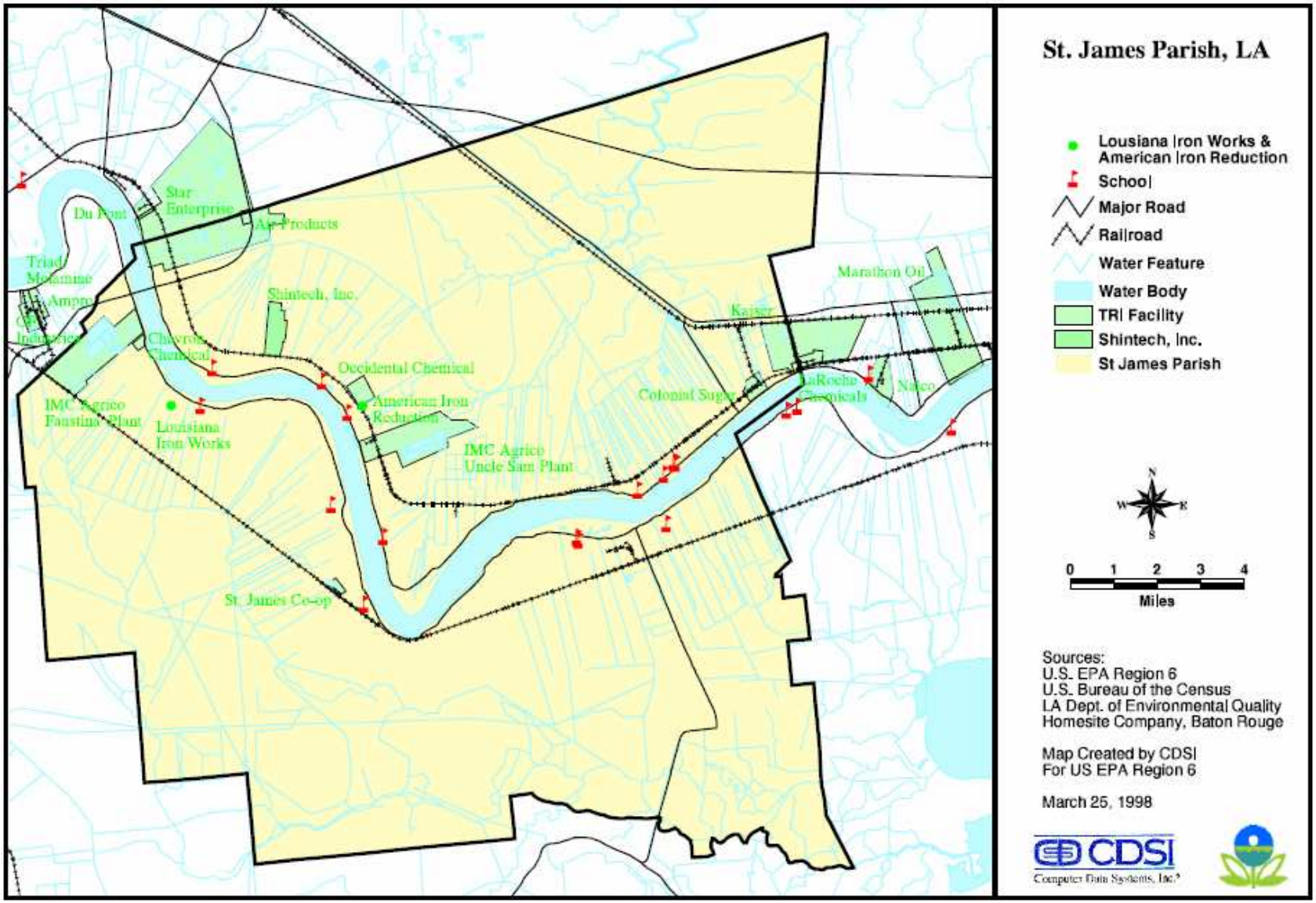


Figure 3. St. James Parish, Louisiana

with small green filled circles with no explanation on the map that the facilities are under construction. The existing facilities, the facilities under construction, and the proposed Shintech facility are labeled with green text on the map.

Green, on USGS topographic maps, is the color for woodlands and croplands. On more general cultural level, green is the color of safety and the color for clearance to proceed as in the green light on a traffic light. Depicting facilities that emit millions of pounds of toxic chemicals into the environment with the color green goes against cartographic convention and cultural norms. EPA's choice on this matter is particularly ironic given that St. James Parish is a rural parish with considerable sugar cane cultivation and sustainable acreage in swamplands. That maneuver was a cartographic error with potentially serious social and political consequences.

The EPA map *Toxic Release Inventory Sites with Releases Reported in 1995* (Figure 4) is a map of the state of Louisiana with all TRI facilities in the state plotted. The map also depicts the "Industrial Corridor" as defined by DEQ by shading with gray those parishes and assigning the appellation of "Industrial Parish" in the explanation on the map. On this map, the proposed Shintech facility is depicted by a blue filled circle as if it exists with no explanation of its status as a proposed facility.

As noted in the preceding chapter, the stretch of the Mississippi River from Baton Rouge to New Orleans is referred to by different names by different groups and the name used can indicate political affiliations. The different names are partisan markers for many concerned citizens and certain institutions. EPA chose to use the name for the region that the DEQ deploys. For EPA to deploy these terms marks the agency as partisan in the eyes of many of citizens, particularly the SJCJE. Many citizens and grassroots organizations are fed up with

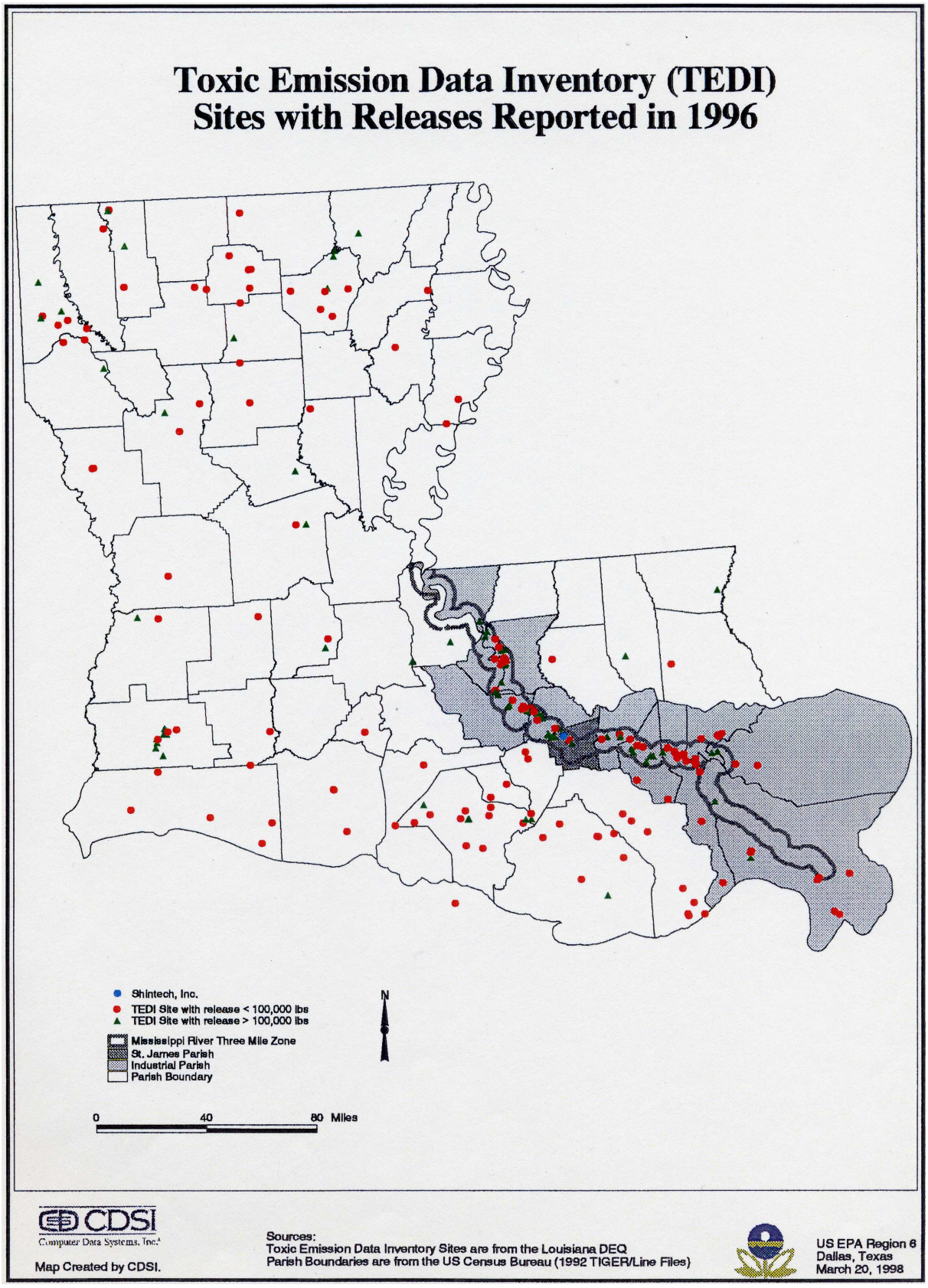


Figure 4. Toxic Release Inventory Sites with Releases Reported in 1995

this area being defined as a place that privileges industry over people. The appellations of Industrial Corridor and Industrial Parish are hardly neutral because these terms, especially coming from the EPA, can be read as if the region were *zoned* or otherwise designated for industry.

The EPA map Toxic Emission Data Inventory (TEDI) Sites with Releases Reported in 1996 (Figure 5) is a variation of the EPA map Toxic Release Inventory Sites with Releases Reported in 1995 (Figure 4). The chief differences are that this map depicts a different subset of TRI facilities and emissions data. Also, the data for emissions is from 1996. All comments for Figure 4 also apply to this map.

The EPA map, *Example of 1 Mile Zone Showing Census Blocks*, (Figure 6) depicts the proposed Shintech facility as a green filled circle and as an outline of the "footprint" of the planned physical structure. The EPA mistakenly labeled this footprint as the "Shintech Fenceline." Fenceline refers to the property boundary not the physical structure of the facility.

This is not a trivial mistake. From this map, the proposed Shintech facility, represented by the green filled circle, would appear to be about the size of a large house setting on a very large lot. This impression is magnified as this map is the largest scale map in their report and some users may expect it to provide the most detailed representation of the proposed Shintech facility and environs.

This map also depicts census blocks that are within a one-mile radius (buffer zone) of the point that represents the proposed Shintech facility. This map, like all other EPA maps in their report, fails to label the proposed Shintech facility as proposed. The total number of people in the census block is shown along with the number of people counted as being within the buffer zone. For the purpose of the EPA analyses, the population was assumed to be evenly

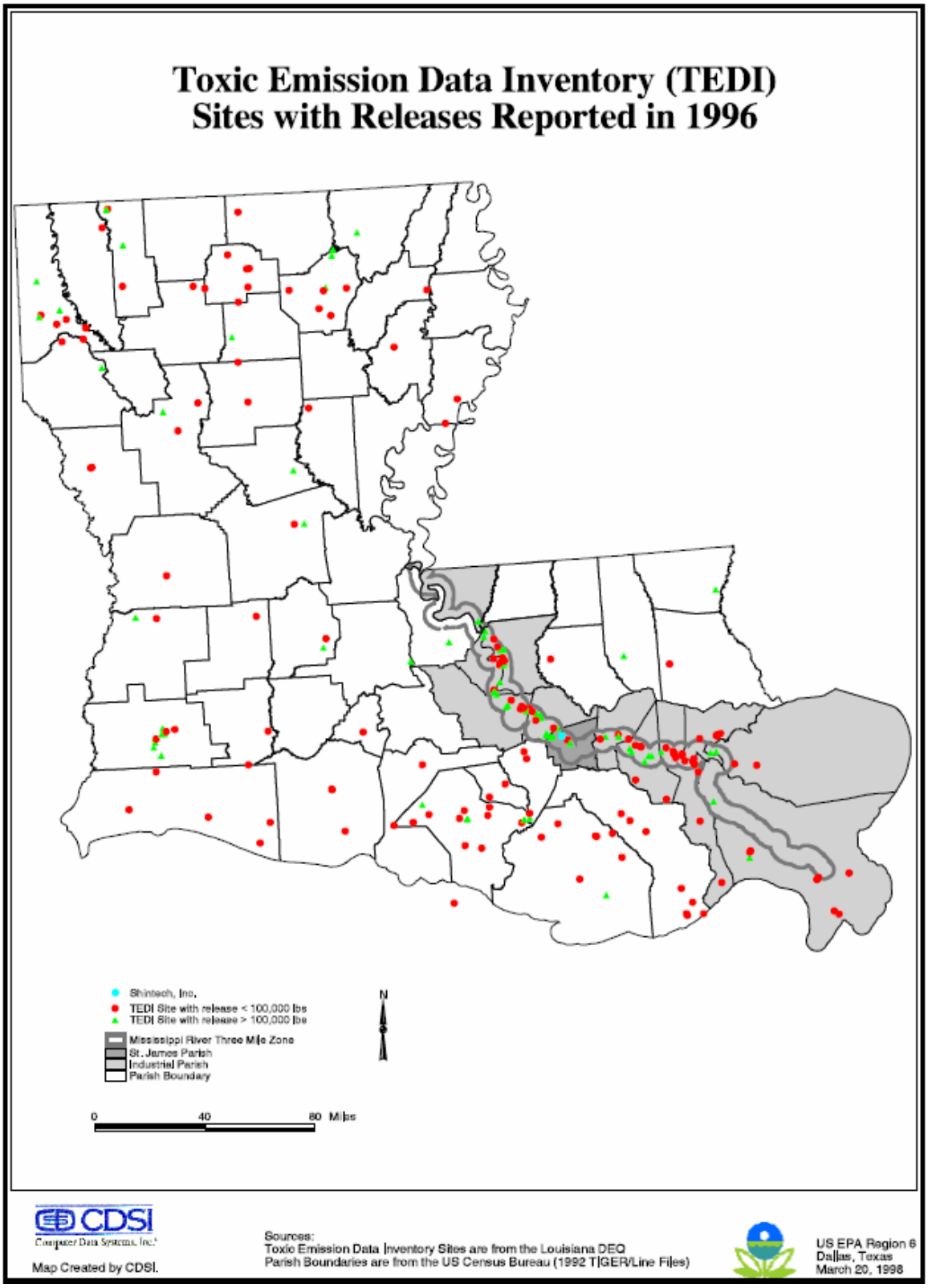


Figure 5. Toxic Emission Data Inventory (TEDI) Sites with Releases Reported in 1996

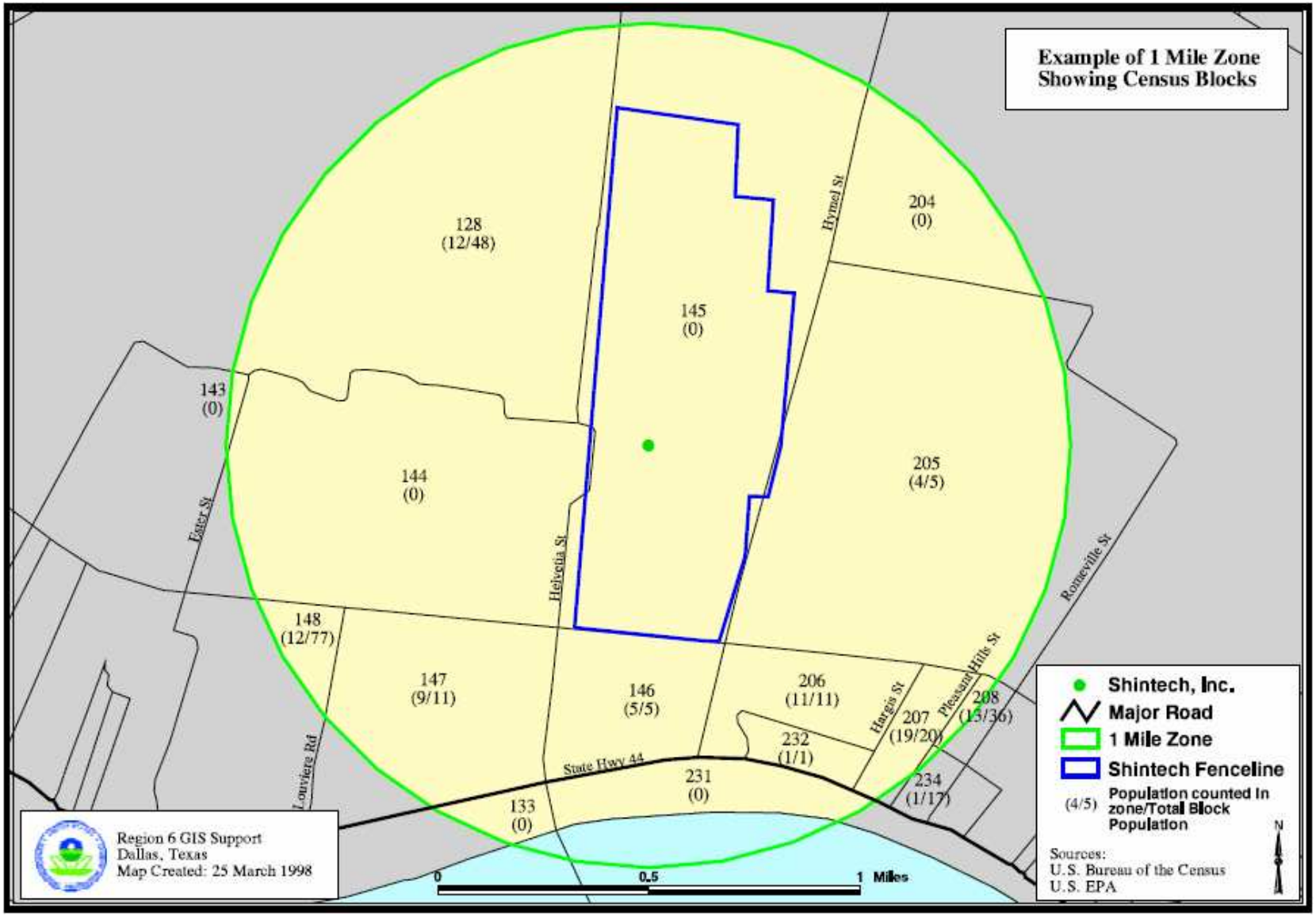


Figure 6. Example of 1 Mile Zone Showing Census Blocks St. James Parish, Louisiana

distributed within the census blocks. So, if a census block was totally within the buffer zone generated around a facility or proposed facility, the total population of that census block was included in the analyses. If a census block was bisected by the buffer zone, then only that proportion of the population corresponding to the percentage of the blocks area covered by the buffer zone would be counted. Therefore, if 40 percent of a census block's area were within the buffer zone, then 40 percent of that census block's population would be included in the EPA analyses.

This is another example of the state superimposing abstract space on social space. With this spatial analytical technique, humans do not live in houses or apartments. The humans do not live together as families or friends. Under this model, the humans are evenly distributed as if they were assigned grid cells the size of which is a mathematical function of population density and size of the census block.

Along with the abstract treatment of the population, the landscape is also depicted very abstractly. The streets are labeled but that is the extent of the humanizing of this mathematical surface.

The EPA map, *Illustration of Overlapping Radii for Populations Near Multiple Facilities* (Figure 7) is a diagram demonstrating the EPA's method for counting populations that are located near more than one facility. This diagram continues the EPA practice of very abstract representations of space. EPA maps (Figures 8 and 9) depict subsets of the TRI facilities in the 11 parishes along the Lower Mississippi River starting with West Feliciana Parish and ending with Plaquemines Parish. The EPA followed the DEQ appellation for this region and called it the "Industrial Corridor." Some of the social implications and political aspects of this maneuver were discussed above.

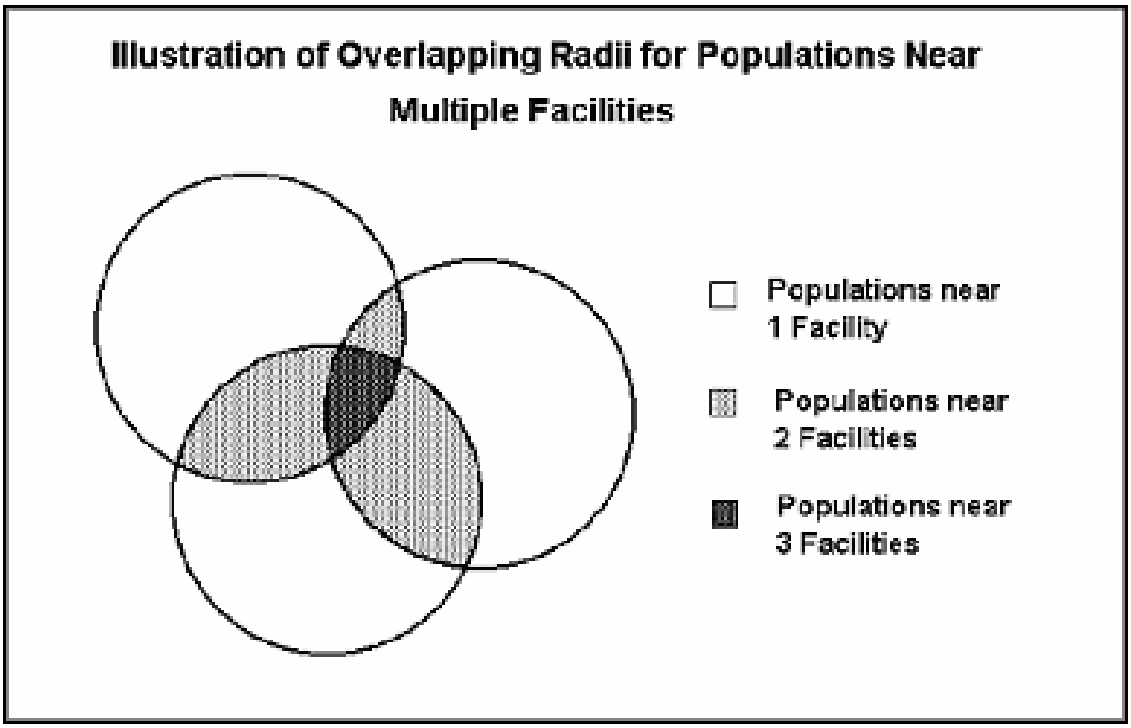


Figure 7. Illustration of Overlapping Radii for Populations Near Multiple Facilities

The EPA map, *St. James Parish Population Estimates*, (Figure 10), depicts TRI facilities in St. James Parish, including the proposed Shintech facility, as points. TRI facilities within two miles of the parish boundary are also plotted. Each of these facilities has a two mile buffer zone around the facility point. The areas that fall within a two mile buffer zone in St. James Parish are shaded green. These green areas show where the population was counted for the "Two mile population estimates for St. James Parish." These population counts were used for different analyses conducted by the EPA.

On this map, filled red circles depict all TRI facilities. Shintech, yet again, is not distinguished as a proposed facility but rather has the same symbol as actually existing facilities. No facility is labeled by name. There are no graphic signs of any human settlement whatsoever. Social space has been completely subsumed under the abstract space of capital and the administrative maneuvers of the state.

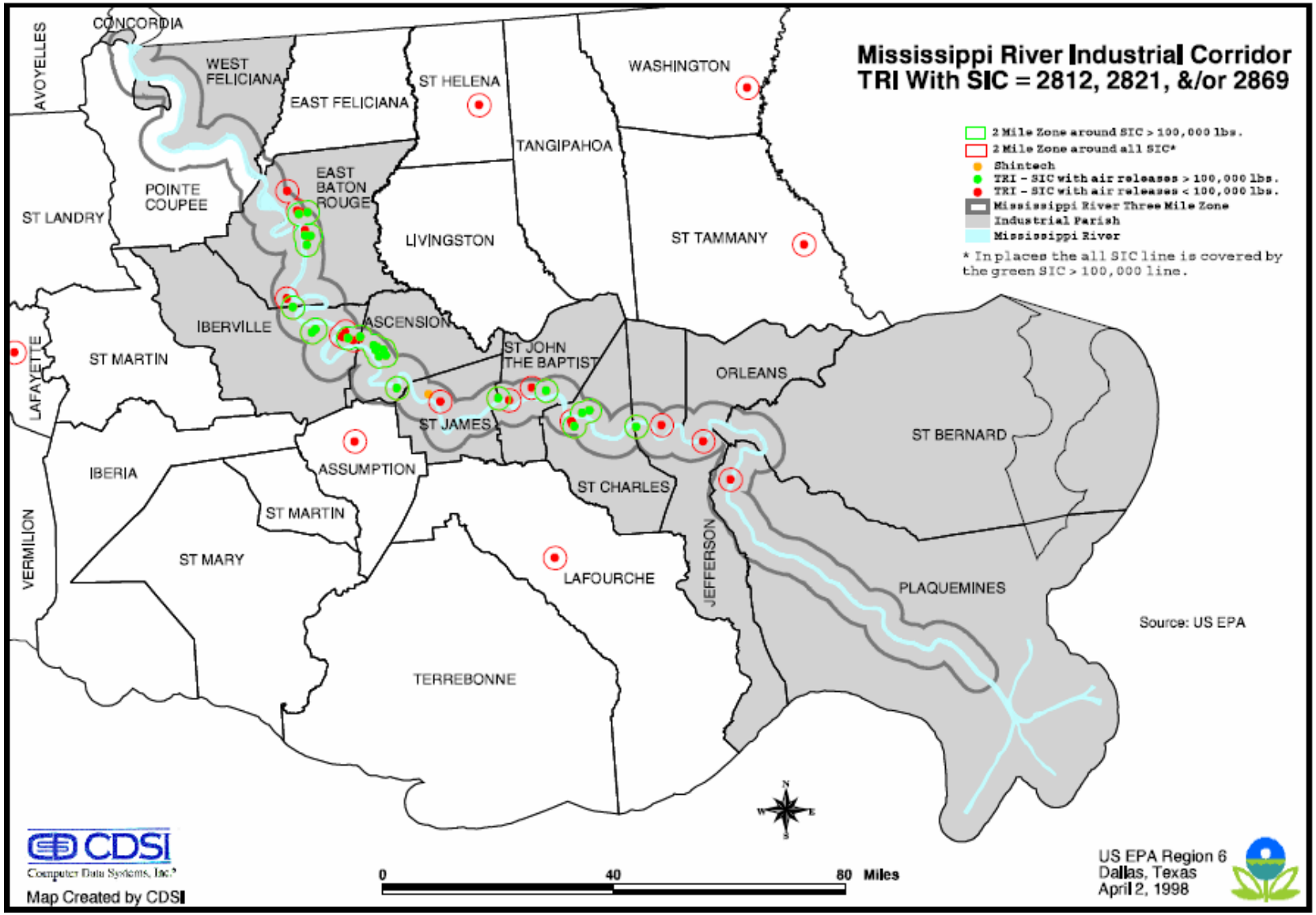


Figure 8. Mississippi River Industrial Corridor TRI with SIC = 2812, 2821, &/or 2869

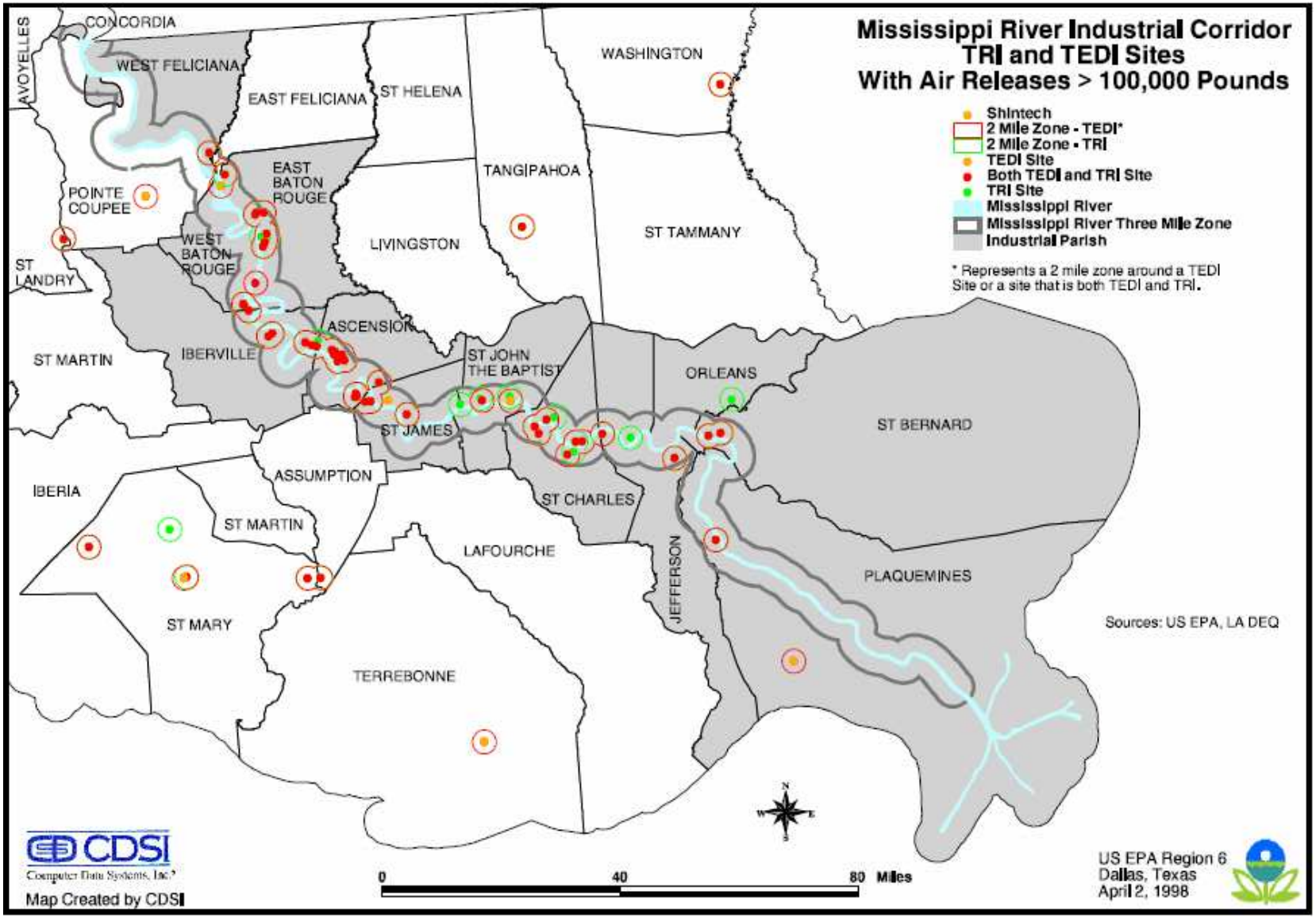


Figure 9. Mississippi River Industrial Corridor TRI and TEDI Sites with Air Releases > 100,000 Pounds

Another noteworthy aspect of this map is the use of the green shading of the buffer zones around the facilities. This color scheme gives the impression that woodlands or parks surround the facilities.

EPA (Figures 11 – 16) depicts census blocks of population density and the percent of the population that is African American in St. James Parish. The TRI facilities in St. James Parish and within two miles of the parish boundary are plotted. Again, the proposed Shintech facility is depicted as if it exists. These maps use the facilities as points or polygons (the fenceline – the property boundary discussed above) to construct buffer zones which are used to calculate the population density or African American population within two miles of the facilities. These calculations, and others conducted similarly were used to conduct the statistical tests for discriminatory practices by DEQ. So, this series of maps illustrates how EPA derived some of the data that went into their statistical tests.

Once again, EPA has produced a highly abstract rendering of St. James Parish. As on previous maps, there are no roads, no bridges, no towns, or no other items to help citizens orient themselves on the maps. These maps are highly abstract rendering of what is in reality a viable community.

The EPA map, (Figure 17), *Shintech TRI/TEDI Facility Four Mile Zone*, depicts TRI facilities and a subset of TRI facilities as points with four mile buffers zones constructed around the points. Once again, I must point out that the EPA mapped the proposed Shintech facility as if it exists. This map is also a highly abstract rendering of St. James Parish. This map includes some major roads but does not label them. Again, the parish, as depicted by the EPA, seems to be devoid of human settlement. This rendering of space would seem to benefit the interest of industry over the citizens.

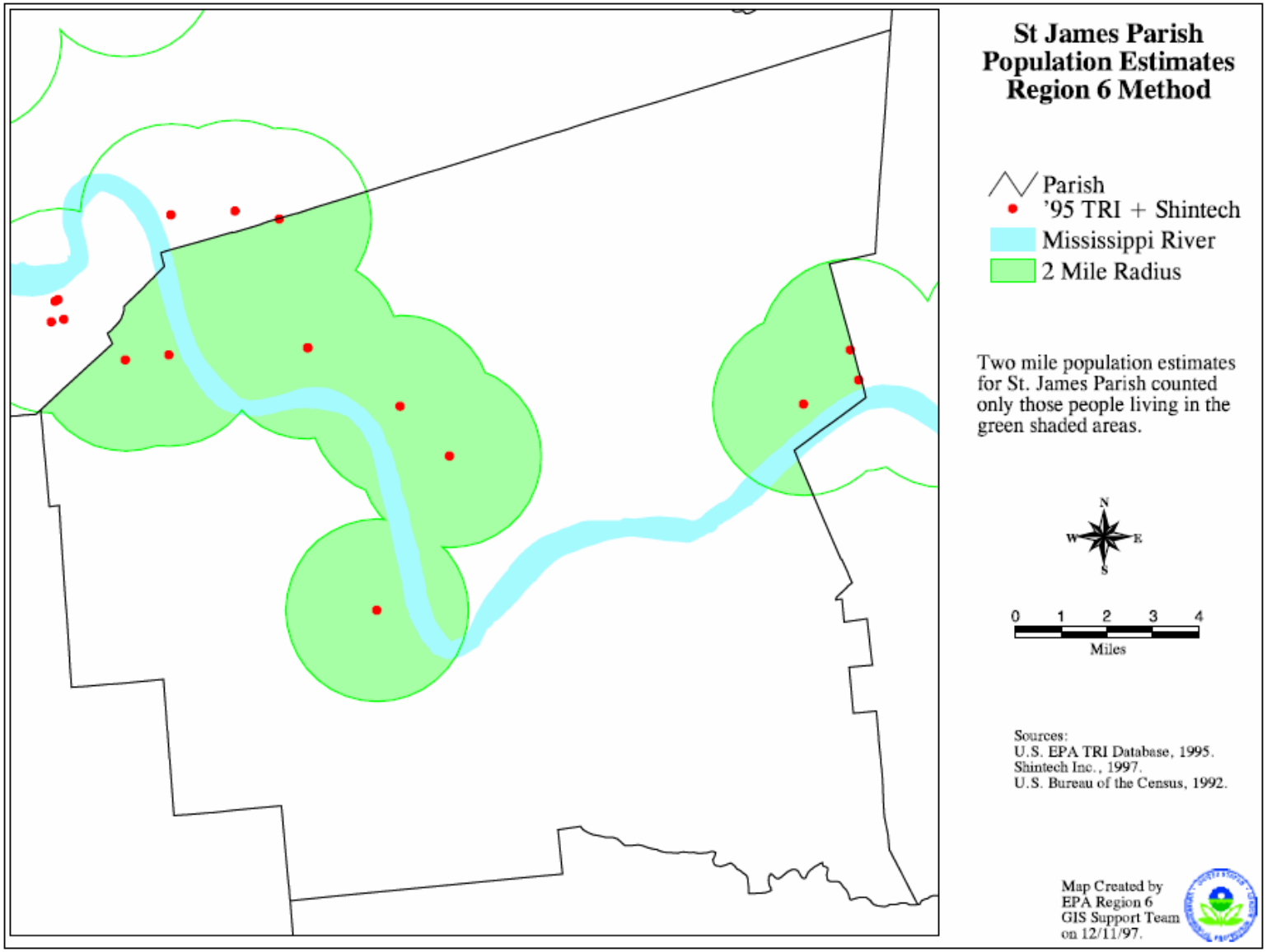


Figure 10. St. James Parish Population Estimates

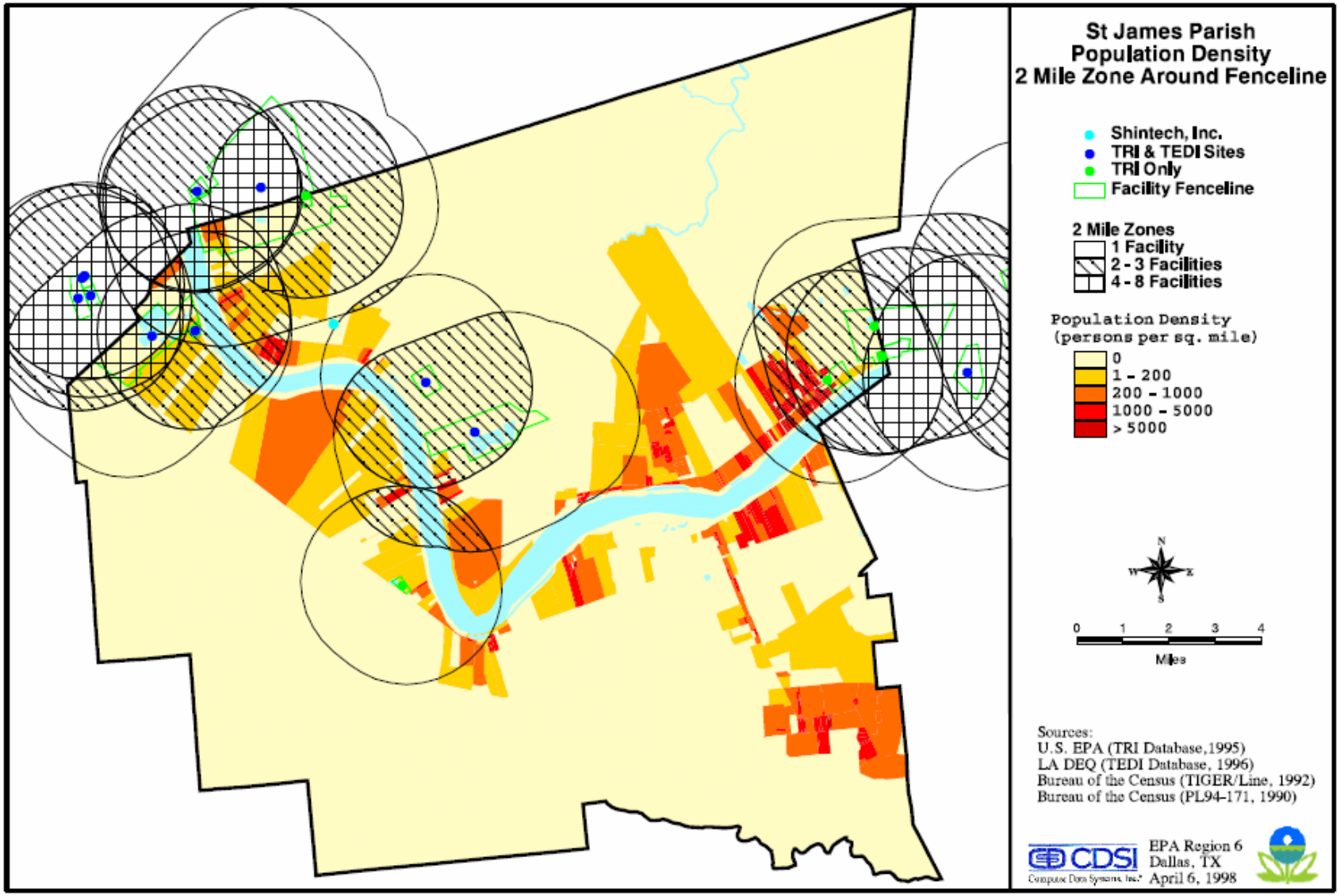


Figure 11. St. James Parish Population Density 2 Mile Zone Around Fenceline

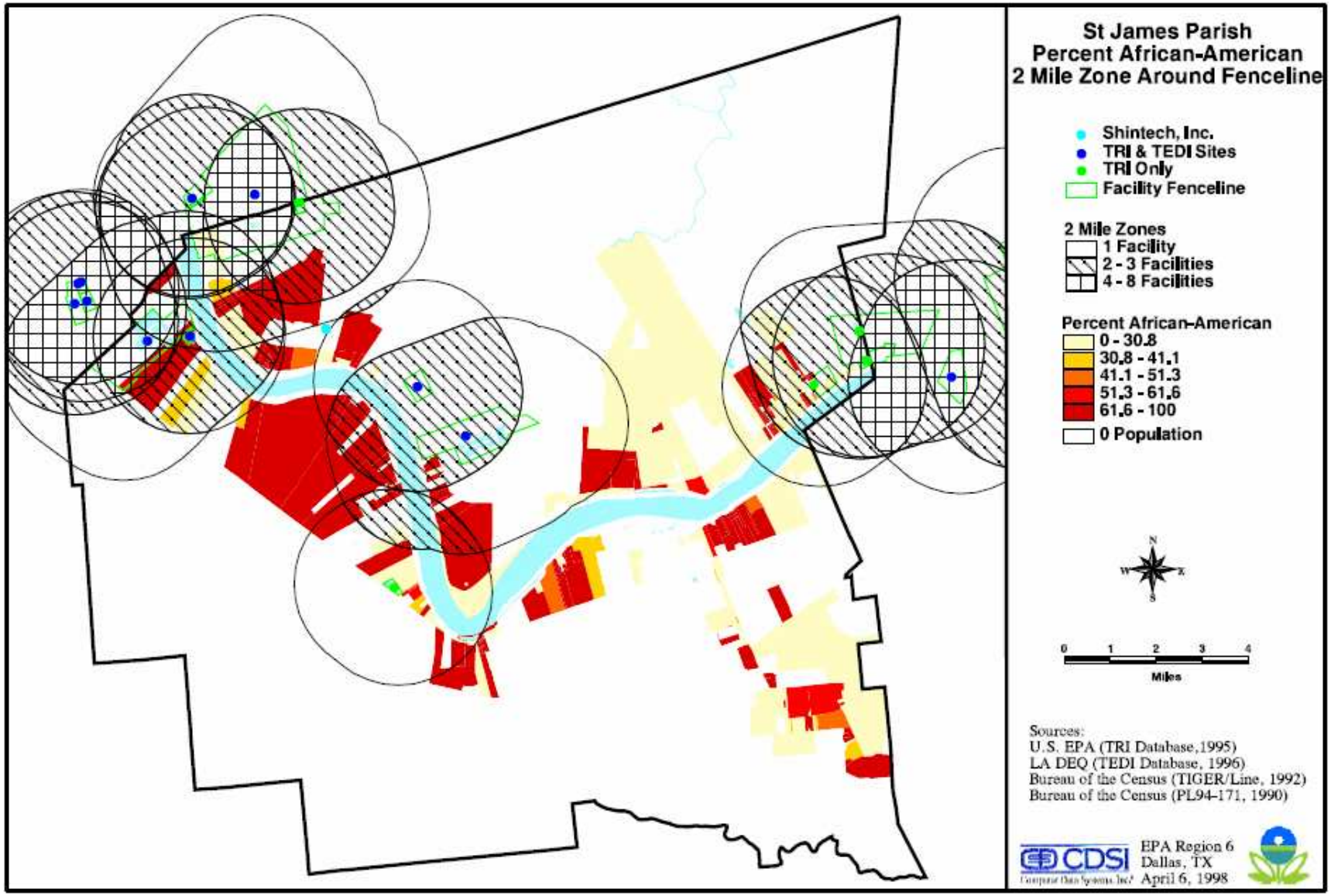


Figure 12. St. James Parish Percent African American Around Fenceline

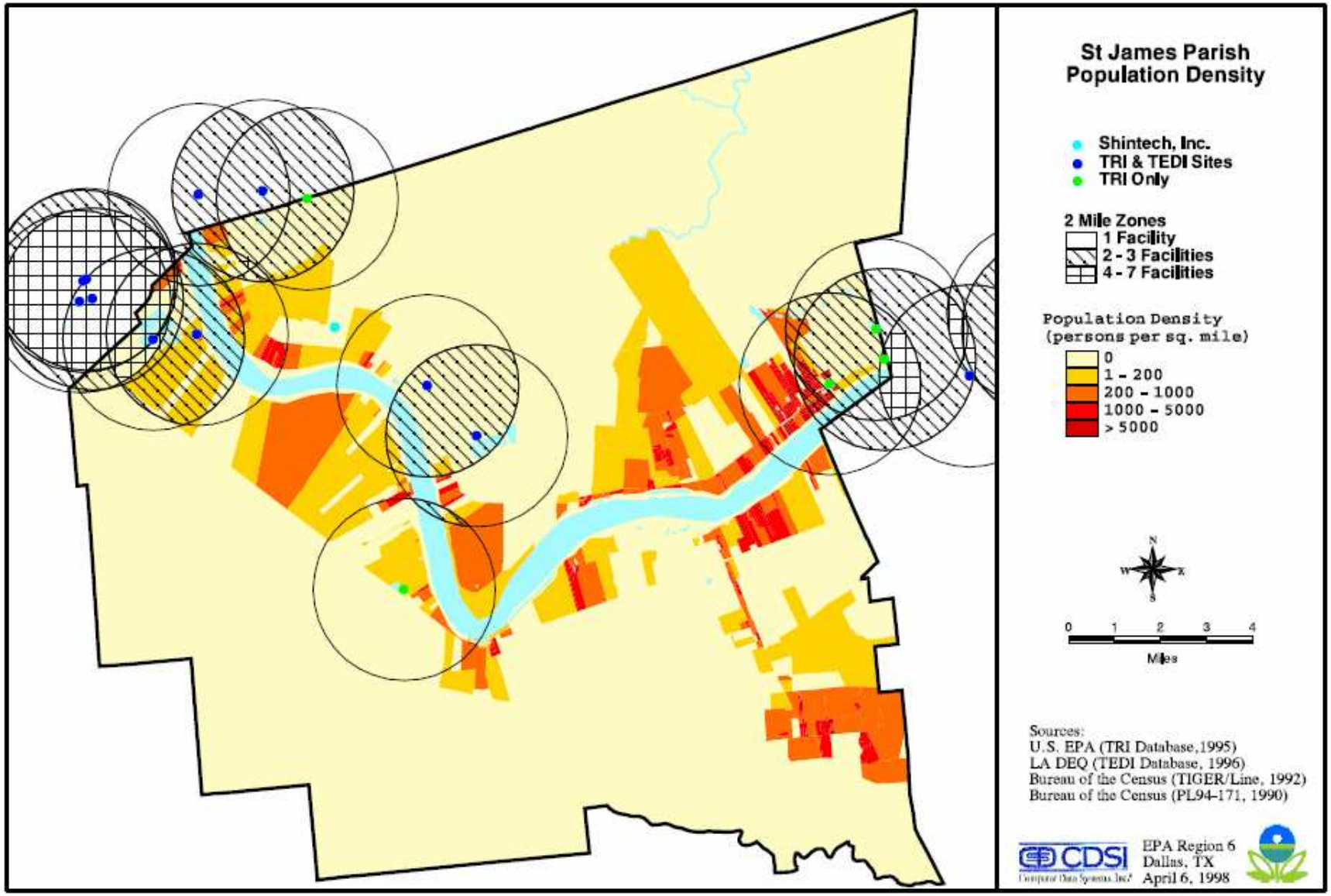


Figure 13. St. James Parish Population Density

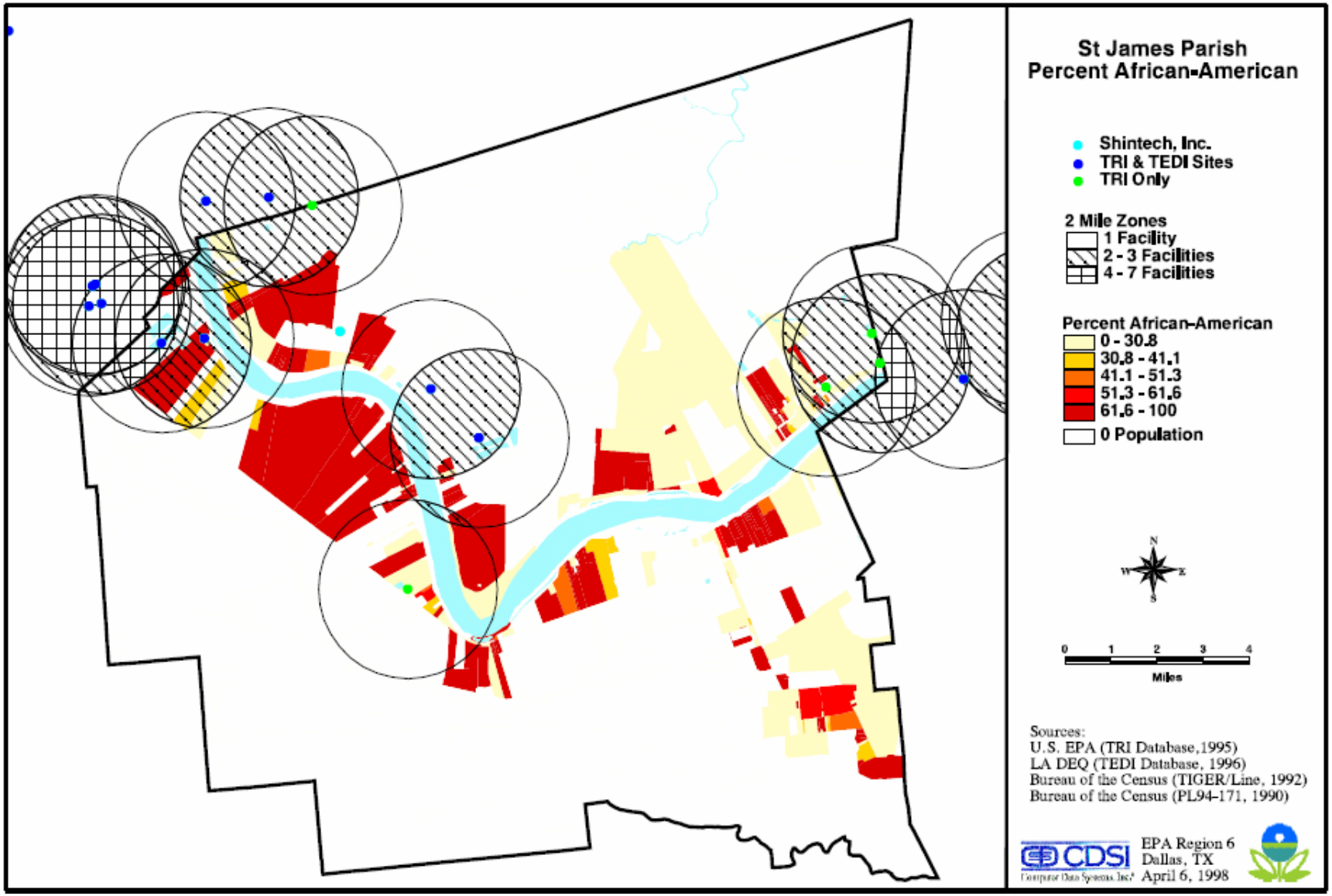


Figure 14. St. James Parish Percent African American

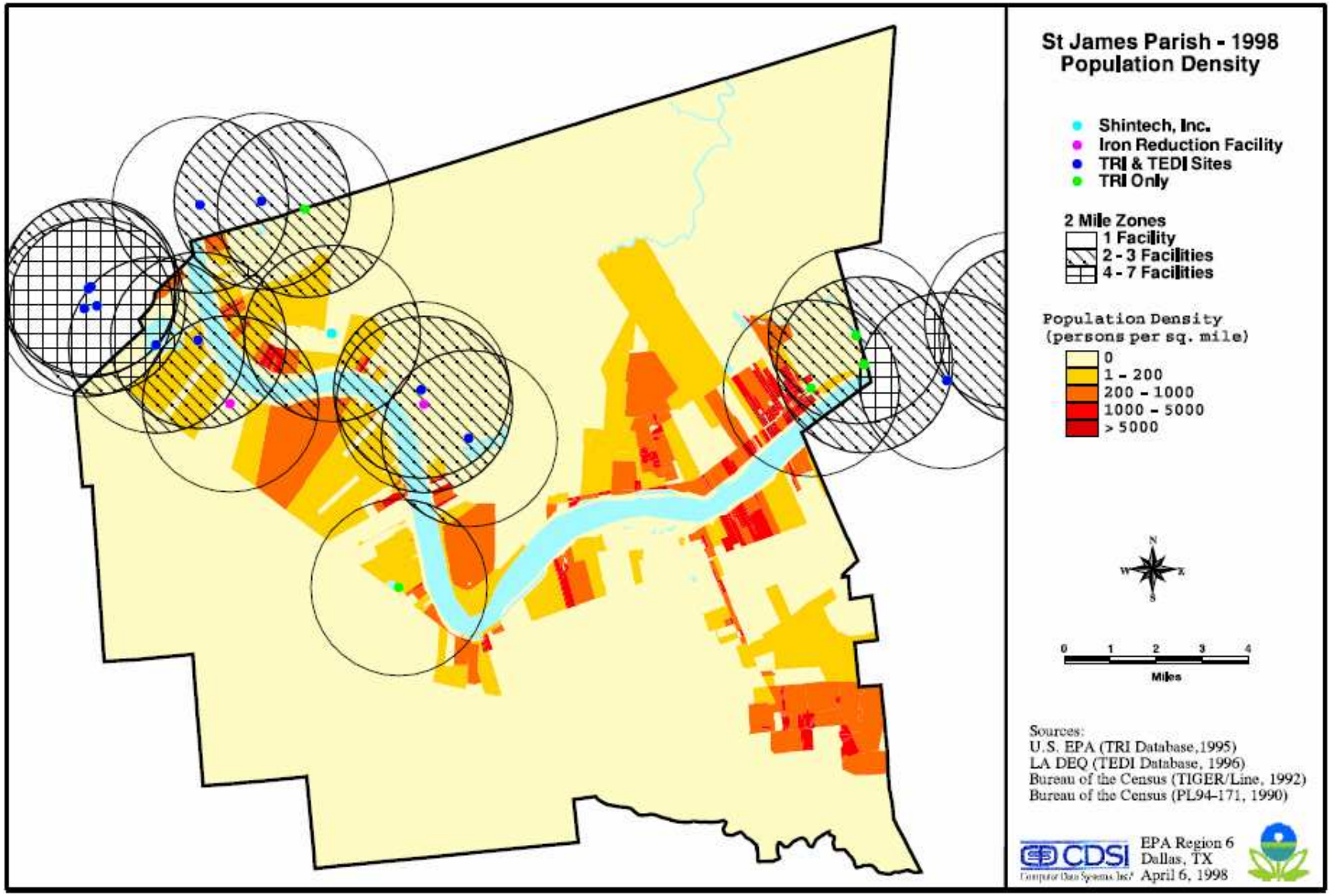


Figure 15. St. James Parish – 1998 Population Density

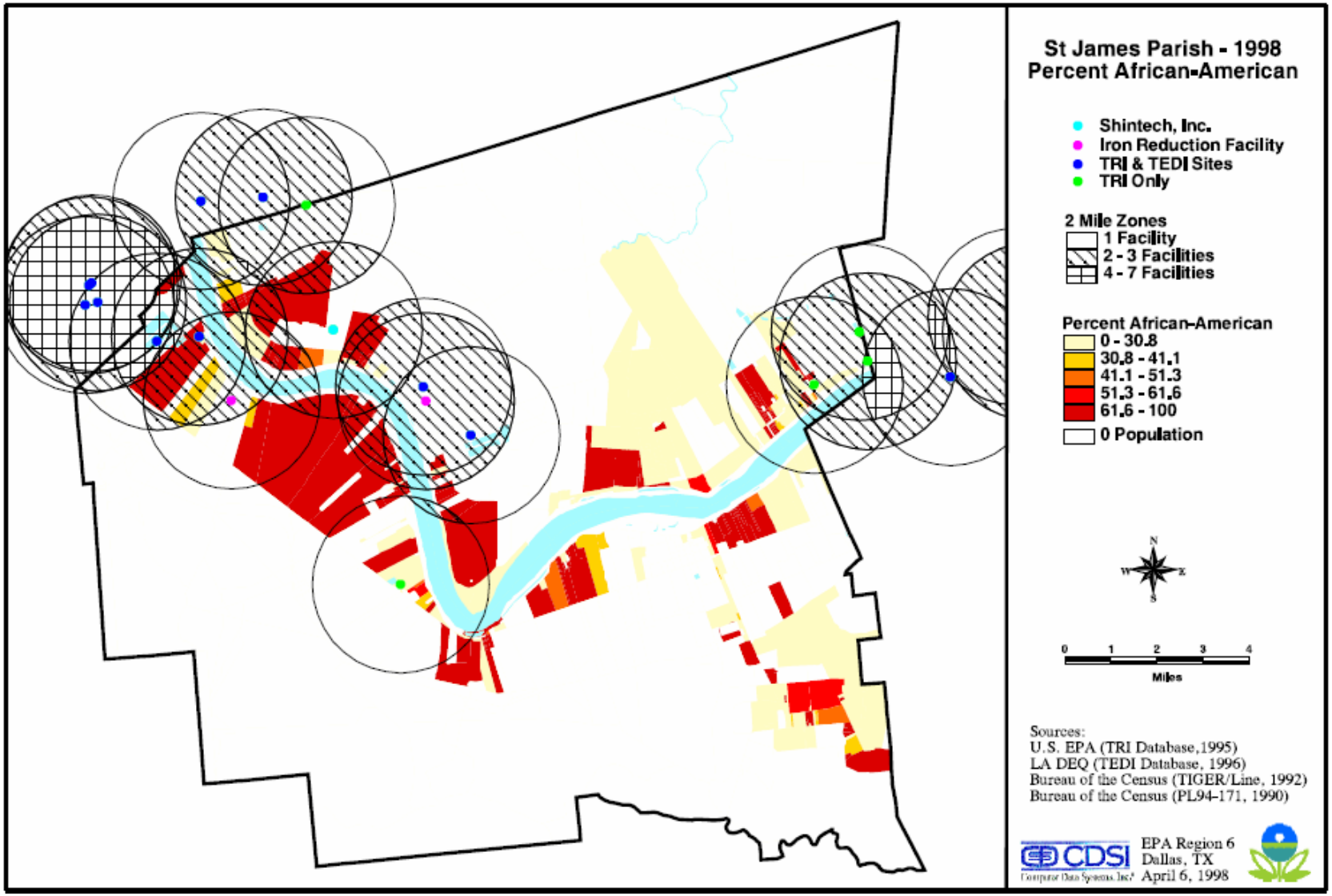


Figure 16. St. James Parish – 1998 Percent African American

EPA Tables

As part of the EPA investigation, the agency conducted a suite of statistical analyses to address the question of whether or not the DEQ conducted their permitting activities in a non-discriminatory manner. The EPA mapping practices reviewed above were instrumental in developing the demographic data for these analyses. The EPA reported their results in a series of tables. This section reviews the analyses and tables.

The EPA study used four different spatial scales for analysis: 1) the entire state of Louisiana; 2) the "Industrial Corridor" parishes; 3) the "Industrial Corridor 3 Mile Zone" which is a three mile zone on each side of the Mississippi River within the "Industrial Corridor"; and 4) St. James Parish (USEPA 1998: 20).

Within each of these four spatial scales, the EPA conducted additional analyses by incorporating additional variables. Among the additional variables were amount of emissions from the facilities; distance from facilities based on 1, 2, and 4 mile buffer zones around the facilities; proximity of the population to multiple facilities within the three different sized buffer zones; relative toxicity of the emissions from the facilities; and calculations based on whether the facilities were plotted as points or polygons.

The final result of all these permutations is eighteen different tables with eleven demographic statistics as columns and a total of 658 rows. At the end of each row is a demographic statistic calculating whether or not at that scale and with a particular set of variables, there is an association between race and proximity to a facility or facilities. The EPA did not present any conclusion or summary of these essentially 658 different tests.

I counted the number of times the 658 different tests found an association between race and proximity to a facility or facilities. The results were 480 times an association between the

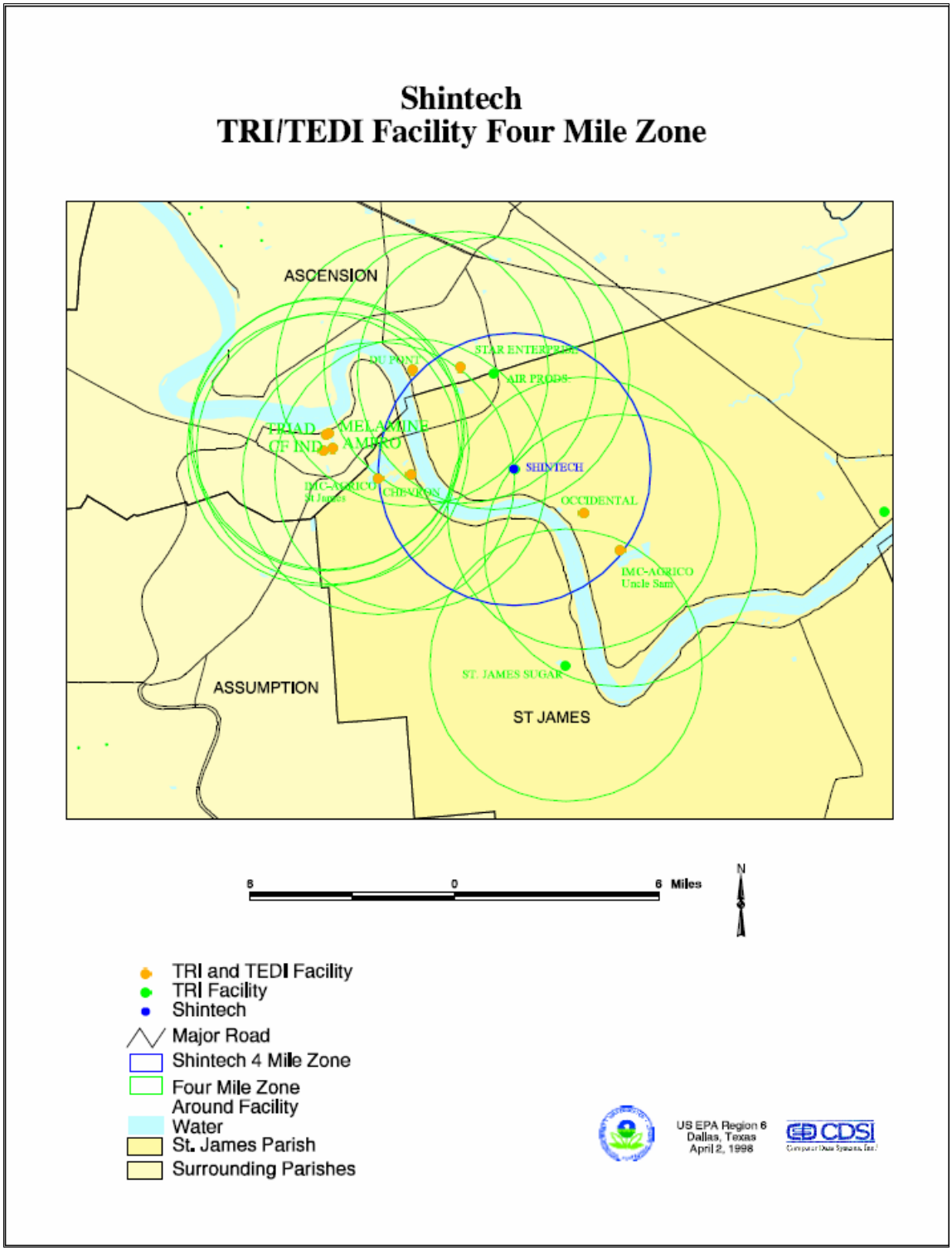


Figure 17. Shintech TRI/TEDI Facility Four Mile Zone

African American population and proximity to facilities was found, 178 times an association between the non-African American population and proximity to facilities was found, and 46 times there was no population that were described by the variables. The clearest pattern amongst this blizzard of data was that in the 70 tests that used the measure of relative toxicity (described above), 60 resulted in an association between the African American population and proximity to facilities.

These results aptly illustrate the findings of McMaster et al. (1997), noted in the previous chapter, that point out that the methodologies deployed greatly impact the findings of environmental justice or environmental injustice. These results also illustrate the suggestion Williams (1999) offered in the preceding chapter: a consensus on methodologies for environmental justice studies will not be soon forthcoming.

As noted previously, this dissertation is not another quantitative analysis of environmental justice. This dissertation critiques the mapping practices of the EPA and Shintech on theoretical issues and presents an alternative approach to mapping that is qualitatively different. My alternative approach is not a solution to the impasse on environmental justice methodologies. What I am suggesting is an alternative approach to mapping that is a necessary complement to the typical facility-oriented approaches.

The Administrative Complaint was never resolved or concluded because Shintech "suspended" their application for operating permits for the proposed facility in St. James Parish in September, 1998.

Shintech

The Shintech materials are from various documents that the corporation submitted to the DEQ as part of the process to obtain an operating permit or for public relations purposes

associated with the permitting process. The materials treated herein are related to Shintech's environmental risk assessment.

Environmental Risk Assessment by Shintech

Shintech (1997a) conducted an environmental risk assessment as part of complying with state environmental regulations. Figure 18 is the diagram that Shintech (1997a: n.p.) included as part of its permit application illustrating the proposed facility's emission sources and the three structures where the human "hypothetical receptors" (Shintech 1997a: 9) were located which were included in their human health assessment:

1. Romeville Headstart and Elementary School
2. Nearest residence
3. Restaurant

Shintech reports that they followed EPA risk assessment protocols and calculated that the projected emissions *from their* proposed facility would not exceed EPA acceptable risk thresholds for "hypothetical receptors" at any of the three locations depicted on their diagram. Shintech characterized several uncertainties in their calculations for the environmental risk assessment. They made no mention of the potential impact on their calculations of the existing toxic burden in neither the community nor where the "human receptors" may be when not at the three locales treated in their environmental risk assessment. (Shintech 1997a: 18–24) Under the heading of "Uncertainties in Estimates of Exposure Assessment," Shintech states they probably overestimated the exposures to the "human receptors" at the restaurant and residence because it is unlikely any human would be at those locales for the duration assumed for the hypothetical receptors used in the modeling. No mention was made of uncertainties with the "child receptor" under this heading. The hypothetical "child receptor," the report states, "was

assumed to attend school eight hours per day, 180 days per year for nine years (Shintech 1997a: 16).

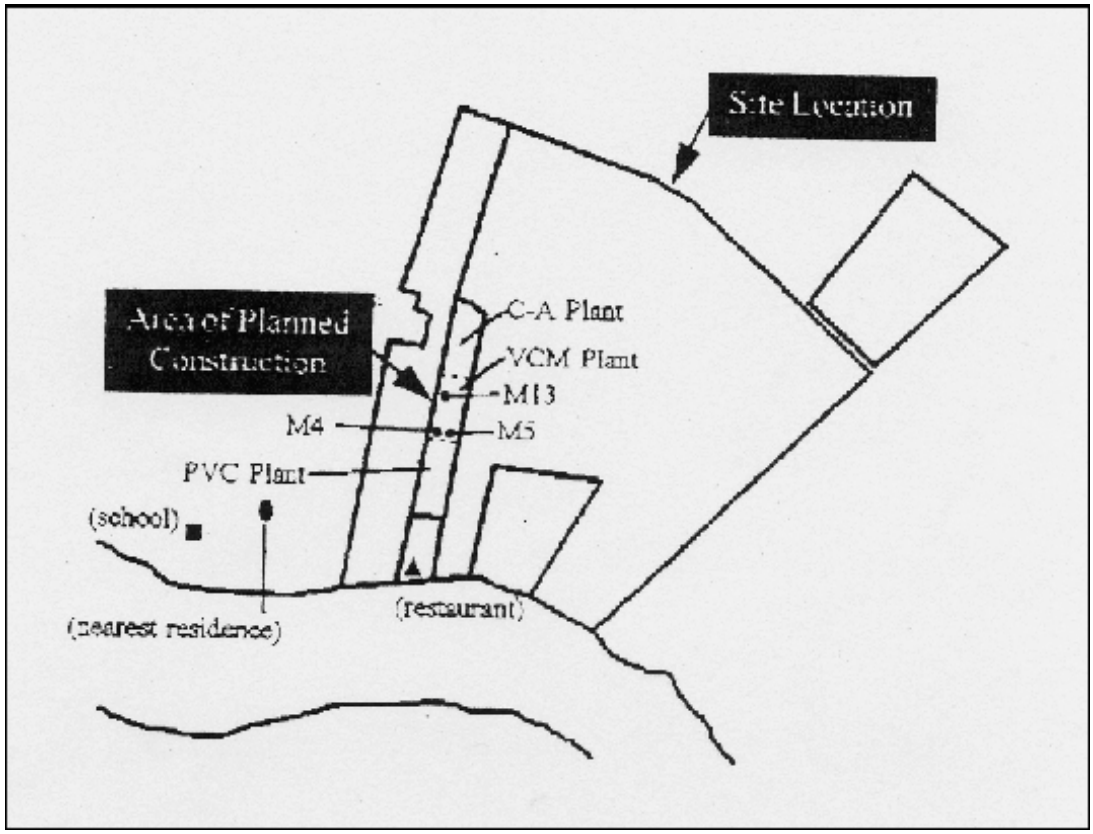


Figure 18. Plant and Receptor Locations

Shintech (1997a: 24) states that since they used conservative values for many parameters the "risk estimate may be orders of magnitude too conservative." The environmental risk assessment concludes, "projected air emissions from the proposed Shintech facility are not expected to pose a hazard to populations who live and/or work in the surrounding areas" (Shintech 1997a: 24). This may well be the case, but the proposed Shintech facility emissions would not take place in some disconnected space. The emissions would occur in a community with a significant existing toxic burden and Shintech did not take this fact into account in their modeling. Therefore, their conclusions of no impact are unwarranted.

Shintech (1997b) sought to position their calculations as valuable scientific knowledge production that contributes to environmental decision-making:

> This risk assessment provides an extremely useful tool for environmental decision-making, in that it allows for a rational and objective evaluation of the scientific data to assess the impact on the health of people in the surrounding population.

Even if we take Shintech's statement that they followed EPA protocols at face value, Shintech's claim to contributing rational and objective environmental decision-making is untenable. The community of Convent has a significant existing toxic burden. To claim that the emission from the proposed Shintech facility will not violate EPA acceptable risk thresholds without calculating the contributions of toxic emissions from the other TRI facilities in the vicinity is simply poor science. As I depict in Figure 19, the existing facilities within approximately two miles of the Romeville School emitted 6.7 million pounds of TRI chemicals into the air. I believe that is a significant existing toxic burden by any reasonable standard.

The environmental risk assessment conducted by Shintech did not produce knowledge. The Shintech environmental risk assessment produced rhetoric constructed by instrumental reasoning grounded in abstract space for the purpose of legitimizing the activities of a multinational corporation.

I am not saying that the EPA thresholds would be exceeded if the existing toxic burden were figured into Shintech's environmental risk assessment. I am saying that Shintech's claim of no impact is unwarranted unless the existing toxic burden is taken into account. My contention is backed up by Shintech's own citation of a National Academy of Science document. Shintech (1997a: 8) cites the document (NAS 1983) as stating that:

> an exposure assessment should consider the magnitude, duration, and frequency of exposure; the potential routes or pathways by which people may be exposed; the size and characteristics of the population exposed; and the uncertainties in the assumptions used and estimates made.

As reported by Shintech, their environmental risk assessment did not adequately address the very criteria they cite as recommended for an exposure assessment.

**An Alternative Approach: Emancipatory Mapping**

This section describes and discusses my alternative approach for emancipatory mapping and environmental justice studies. I will describe my approach and present two examples of this alternative mapping practice.

The EPA methodologies and the methodologies that have been used in every environmental justice study I have reviewed except the paper by Maantay (2002) noted in the previous chapter, have all been facility-oriented. The facilities in any given study area are the points of origin for any analyses conducted. GIS analyses are conducted by creating buffer zones of various dimensions and shapes around representations of facilities and performing some operations on the human population in proximity to the facilities.

Facilities are also the focal points for mapping. As exemplified by the EPA maps above, the facilities function as miniature suns - everything else depicted on the maps revolves around them. Facilities are naturalized as the dominant space on the maps. The abstract space of industry is the organizing principle for all space.

My alternative approach to mapping challenges the privileging of abstract space and asserts social space as the focus of mapping and analysis. I reconfigured mapping to be community-oriented instead of facility-oriented. I produced emancipatory mapping to counter the instrumental mapping of state and industry.

I had numerous discussions with the St. James Citizens for Jobs and the Environment (SJCJE) in 1996. The SJCJE informed me that they had two particularly worrisome concerns about the proposed Shintech facility: 1) the potential health impact the proposed Shintech

facility could have on the school children attending the two schools in vicinity; and 2) the potential cumulative and synergistic effects on the general population in the community of additional air emissions in an already heavily polluted area.

To address these concerns, I produced two maps for the SJCJE. For one map (Figure 19), I plotted the two schools in the area and added up the TRI air emissions around the schools. For the second map (Figure 20), I plotted the two most populated streets in area and added up the TRI emissions around those streets.

I used satellite image as backdrop for the maps. The satellite image provides a more realistic depiction of the Convent area landscape than the abstract representations of the community created by EPA and Shintech.

The locations of the schools in the community and Legion and Burnside streets were verified by field checking. I also field checked the location of all TRI facilities depicted on the map. Some of the facilities depicted on the map have changed names since the map was created. The labels on the map were correct at the time of map creation.

I designed the maps to be somewhat "self-contained." I anticipated that the manner in which the maps were to be used by the SJCJE to educate fellow citizens, government workers, and elected officials that the maps would *not* have the benefit of accompanying text to elaborate on the emissions from the facilities, facility identification, data sources, or contact information for LEAN or myself. The resulting maps are therefore cartographically "busy," but they do stand on their own.

The satellite backdrop serves at least four functions. One, the image provides numerous recognizable features to help the local citizens locate places of particular concern to them. For example, on the largest (2' x 3') copy of the map that I gave to the SJCJE, many citizens could

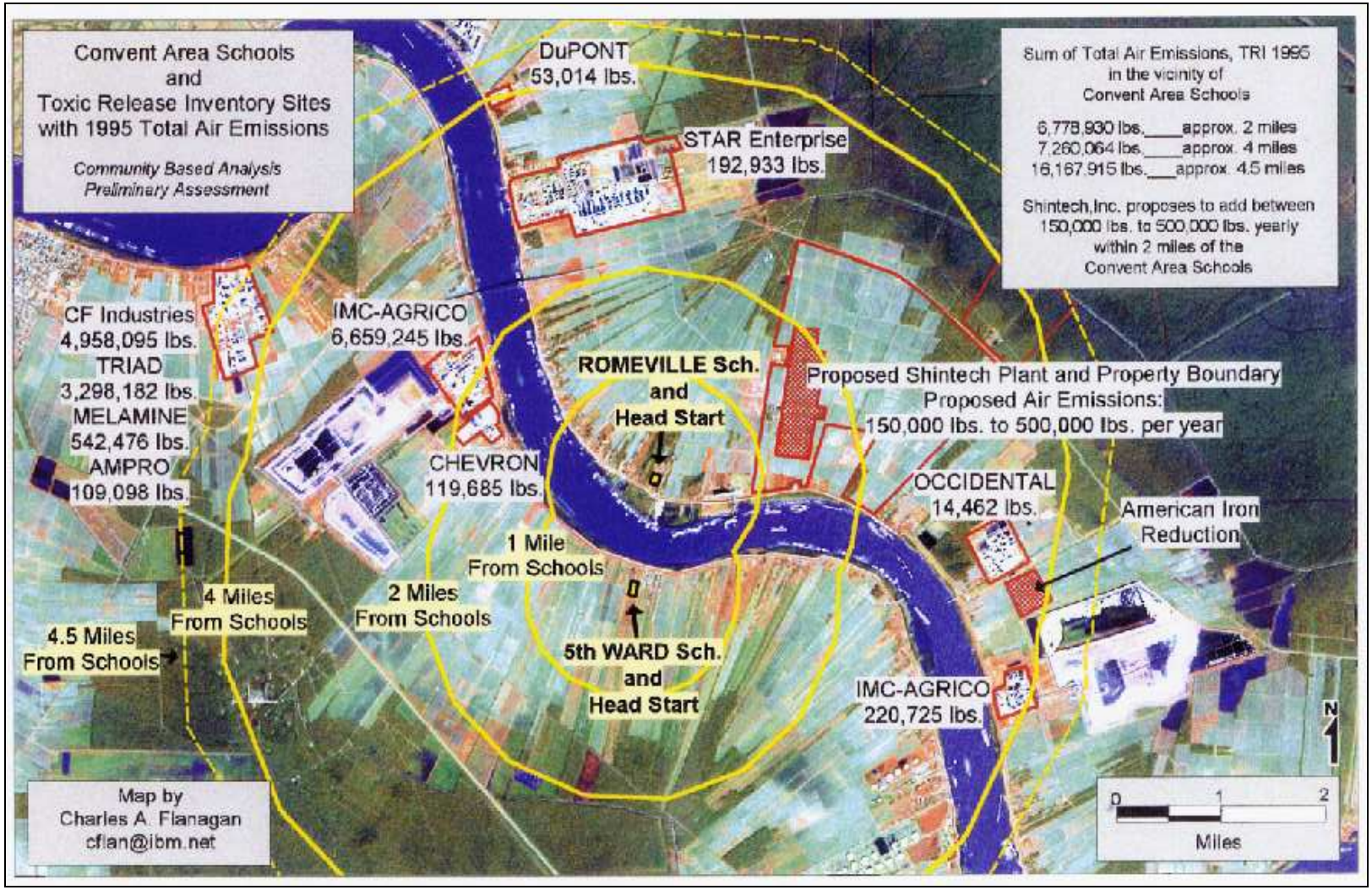


Figure 19. Convent Area Schools and Toxic Release Sites with 1995 Total Air Emissions

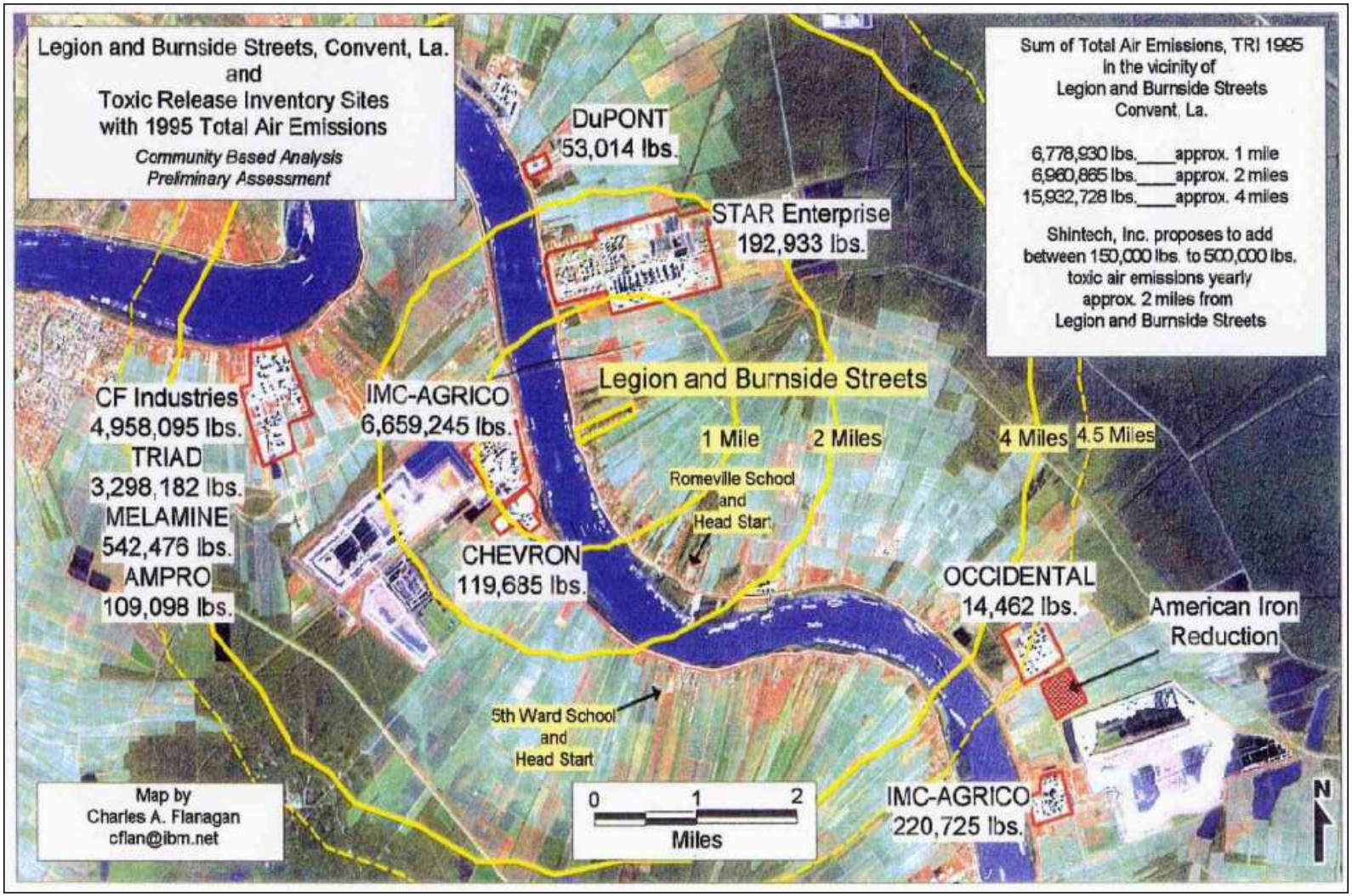


Figure 20. Legion and Burnside Streets, Convent La. and Toxic Release Sites with 1995 Total Air Emissions

locate their own homes. I also produced and gave the SJCJE numerous 11" x 17" copies of the map. Many citizens could locate their homes on this map too. This is in contrast to the EPA maps that were largely devoid of evidence of human habitation or landmarks that could serve to orient citizens.

Two, the image provides a photographic image of the existing TRI facilities. The image affords the opportunity to map the actual facility footprint. This is in contrast to the EPA methodology, discussed above, which depicted the facilities as a dot by relying on a single pair of longitude and latitude points or by the "polygon" of the facilities' property boundary.

Three, the color image shows what is really green in the area. The swamplands in the northeast section and in the southwestern section of the map are green on the image and green in reality. The numerous cane fields are likewise realistically depicted. This is in stark contrast to the EPA practice of depicting TRI facilities as green polygons or green shaded buffer zones around TRI facilities.

Four, the plantation past, agricultural history and current importance of cane cultivation in the area is also discernable from the satellite image. St. James Parish could be called "Cane Parish" in juxtaposition to the EPA/DEQ appellation of "Industrial Parish."

Map of Convent Area Schools

I plotted the local schools onto the satellite image (Figure 19). The schools are displayed as small yellow filled polygons. I placed the schools at the center of the map and plotted the TRI facilities in the vicinity and the proposed Shintech facility. Now, social space, *community space,* is the organizing principle of the map and analysis. I then constructed, following EPA's example, buffer zones with radii of one, two, and four miles around the schools. For the purposes of creating the buffer zones, the schools were treated as points, not

polygons. I chose points because of the relatively small size of the schools and I considered this adequate precision for this analysis. I then summed the air pollution released from the TRI facilities from the EPA's TRI data for 1995 within the buffer zones (USEPA 1997).

There are no TRI facilities within one mile of the community schools. Within approximately two miles of the schools 6,778,930 pounds of TRI substances were emitted into the air in 1995. Within approximately four miles of the schools 7,260,064 pounds of TRI substances were emitted into the air in 1995. In this heavily polluted area, Shintech proposed to add another 192,000 lbs. of TRI air emissions (USEPA 1998: 6)

I noticed a cluster of TRI facilities located just outside the four miles buffer zone. I created another buffer zone of four and a half miles and again summed the TRI emissions resulting in a total of 16,167,915 pounds of TRI substances. Extending the buffer zone by half of a mile more than doubles the TRI emissions count.

The exercise of extending the buffer zone size illustrates four points. One, the results of analyses based on the size and shape of a buffer zone can be very sensitive to relatively small changes. Two, the sensitivity of the buffer zone size and shape demonstrates a certain degree of arbitrariness in the choice of buffer zones size and shape. Changes to the buffer zone size and shape can be made by choice of the point of origin of the buffer zone, as in the difference between plotting facilities as points or by property boundaries as noted above. The cartographer entering different values in the GIS software can also simply generate the buffer zones as a different size. Three, the buffer zone should not be considered an impermeable barrier. The phenomenon that is being examined is somewhat fuzzy – the dispersion of air pollution. It is not a good idea to have crisp barriers delineating fuzzy phenomena. Four, buffer zones for analysis should not be creating zones of abstract space. The buffer zones should not be used to

create an enclosure of abstract space. The zones created are not some kind of exclusionary zones.

Map of Legion and Burnside Streets

The SJCJE's primary concern regarding the proposed Shintech facility was the potential adverse health impact on the children in the area. The greatest concentration of children in the area resides on Legion and Burnside streets so I used those streets as another focal point for community-oriented mapping (Figure 20).

I created a polygon around Legion and Burnside streets. This polygon served as the point of origin for buffer zones of 1, 2, and 4 miles. Again, I then summed the air pollution released from the TRI facilities from the EPA's TRI data for 1995 within the buffer zones (USEPA 1997).

Within approximately one mile of Legion and Burnside streets, 6,778,930 pounds of TRI substances were emitted into the air in 1995. Within approximately two miles of the streets 6,960,865 pounds of TRI substances were emitted into the air in 1995. Within approximately four miles of the streets 15,932,728 pounds of TRI substances were emitted into the air in 1995.

Please note that the maps I created are *not* maps of exposure to TRI chemicals. I consider the word exposure to be a technical term that refers to the *dose* of a chemical that an organism absorbs. My analysis is not attempting to calculate the dose of TRI substances absorbed by the people in the local community. My maps depict the existing toxic burden in the community as reported in the EPA's TRI data from the point of view of the concerns the SJCJE and other concerned citizens in the study area. This is what I call community-oriented mapping. My mapping is based on the social space that is actually experienced by actual human beings.

Now let us reconsider Shintech's environmental risk assessment described in the previous section in light of the community-oriented mapping I just demonstrated. Shintech calculated the risk for a hypothetical "child receptor" whose existence is restricted to 8 hours a day, 180 days a year to one disconnected, evidently pristine point in abstract space. Shintech determined that under these conditions, the EPA's risk thresholds would not be violated. Since Shintech's calculations apply to conditions which exist only in abstract space, the legitimacy of Shintech's truth exist of in abstract space.

The maps I produced of the study area present a very different view of the environment of actual human children from the instrumental constructions of an abstract "child receptor" in abstract space. The actual, lived, community space in which a real child exists is a pollution sink for millions of pounds of toxic substances.

*The other truth* is that the real, actually existing children of the Convent area live in a heavily polluted community with ample opportunity for exposure to more toxic substances than from the proposed Shintech facility. The hypothetical humans in Shintech's risk assessment exist only in abstract space; consequently, the truth of Shintech's environmental risk assessment for those hypothetical humans exists only in abstract space.

Legitimacy in Space

Environmental risk assessments, no matter how sophisticated the modeling, are only legitimate if they pertain to space as experienced by actual human beings. Abstract space is fragmented, "pulverized" to use Lefebvre's term (Lefebvre 1991: 317). The only legitimate space for human health assessments is in social space, the actual community space in which real humans exist. Social space should be the benchmark for the legitimacy of environmental risk assessments.

Dan Borne, president of the Louisiana Chemical Association, seems to be in accord with my assertion:

> If you have plants that emit X pounds of chemicals and each is permitted for a certain amount, I'd have to ask: If you add this up, does it do any harm? That's an area we have to look at very closely with EPA. It gets into the area of chemical soup. As a lay person, I feel like it deserves attention and should not summarily be dismissed with the attitude that 'we all have permits, we're all right.' Realistically that answer does not wash well with the public (McQuaid 2000).

Borne was referring to permitting procedures not to environmental risk assessments. However, his remarks are directly relevant to the notion of considering toxic emissions in the context of social space instead of abstract space.

My maps are not replacements for the EPA maps. Rather, my maps are a necessary complement to the works of the EPA. My maps are a move *toward* representing the view from social space - the everyday, community space of humans.

# Chapter 6

## Discussion

In this chapter, I discuss implications and consequences of my critique of state and industry mapping practices and the alternative approach to environmental justice studies, environmental risk assessments, and facility-siting issues that I proposed. I bring insights from Chapters 2 and 3, theoretical perspectives and historical background respectively, to bear on the case study.

### Mapping is a Human Practice

Mapping, with or without computers, is a human practice – a human practice with significant social consequences. Maps are not "passive reflections" of the world (Harley 2001: 53). Rather, maps are active (Harley 2001: 57): "structuring the human world which is biased towards, promoted by, and exerts influence upon particular sets of social relations." Harley (2001: 57) contends that the influence of maps on social relations typically served the interest of the privileged, asserting that "cartography's role in the transaction of power relations usually favored social elites." Mapping practices privilege certain interests while other interests are marginalized or even completely covered-up (Black 1997, Curry 1998, Edney 1996, Pickles 1995, Harley 2001).

I contend the EPA's maps reviewed in the case study favored social elites. The EPA produced maps that favored the construction of the proposed Shintech facility in St. James Parish. The EPA followed the common historical pattern of state mapping practices privileging the interests of the elite over the interests of the less powerful members of society. A message from the EPA maps was that the proposed Shintech facility was a *fait accompli*.

My maps are also partisan, albeit serving significantly different interests. In accord with Blaut's (1979: 159) description of the dissenting (or critical) geographer, my alternative approach to mapping "attempts to conform... to the interests of different classes, different ethnic cultures, and women; that is, to the interests of working people and oppressed groups." I believe my work is also in accord with Painter's (2000: 126) characterization of the major themes in critical human geography in The Dictionary of Human Geography:

1. Opposition to unequal and oppressive power relations;
2. Development and application of critical theories; and
3. Commitment to social justice and transformative politics.

In the sections below, I will compare and contrast how the different mapping practices presented in the case study serve different interests. The structure below approximately follows the structure of Chapter 2.

Reification

The EPA executed a particularly noteworthy partisan maneuver regarding the representation of the proposed Shintech facility on all the agency's maps. The EPA depicted the proposed Shintech facility as if it actually existed on each of the fourteen maps the EPA produced for their investigation into DEQ's permitting procedures. None of the agency's maps indicated in any manner whatsoever that the proposed Shintech facility was just that – a *proposed* facility.

EPA's mapping choices in this regard are particularly at odds with the contentious battles raging when the maps were made. There were lawsuits pending to block the facility's construction. Furthermore, there was considerable opposition to the proposed facility from several prominent Congressional leaders, numerous highly organized and committed local and

national environmental groups. So, when EPA produced the maps depicting Shintech as a *fait accompli*, the matter was anything but settled.

EPA's moves reify the proposed Shintech facility in at least three ways. First, in the more common usage of the word, the proposed Shintech facility was an *abstraction* that was treated as if it had material existence. On EPA's rendering, the proposed Shintech facility had the symbology and text of any of the actually existing facilities in the state.

Second, reification has been defined by critical theorist as the "tendency for products of human action to appear as though they were 'things', products of *nature* rather than human choices." (Calhoun and Karaganis 2001: 180 emphasis added). Under the sway of reification, the historical development of society is understood as the natural order of things. "Social facts are given the status of natural facts. Historical laws are given the same status as natural laws" (Held 1980: 167-168).

With this more critical treatment of reification, the depiction of the proposed Shintech facility as if it existed is part of EPA's naturalizing Shintech's right to exist. *Historically*, the corridor has been the site of numerous polluting industries. Currently there are approximately 130 TRI facilities in the Corridor. The implication from the EPA maps is that it is *natural* for another facility to be built.

Third, EPA's reification maneuver served Shintech in another way. The EPA appropriated DEQ's industry-biased appellation of the region along the Mississippi River Corridor between Baton Rouge and New Orleans and mapped the "Industrial Corridor" and "Industrial Parishes." EPA took one component of the historical development of the Corridor and effectively declared the region zoned for Industry – and in the case of Shintech, it must be noted, zoned for industry of a significantly polluting kind.

Furthermore, if this region is the "Industrial Corridor" with "Industrial Parishes" what does that make the communities that comprise the parishes – are they "Industrial Communities" populated by "Industrial People"? The EPA deployed instrumental labeling as part of the project of reification of the status quo and superimposing abstract space on social space. This maneuver also supports the agenda of the elite and serves as another example, intentionally or otherwise, of the deployment of cartography by the state. Under the sway of reification, the historical development of society – or of space – is understood as the natural order of things.

The EPA's reification maneuvers regarding the representation of the proposed Shintech facility on the agency's maps are particularly partisan when considered in light of Harley's insight from the history of cartography. Harley described how imperial powers extracted treaties and other land deals from colonized territories, then the imperial powers made maps depicting the spatial extent of the claims. Such documents became powerful images of legitimacy: "these maps more than often acquired the force of law in the landscape" (Harley 2001: 59).

The EPA also reified the actual existing facilities in their study in another manner. As described in the Case Study chapter, the EPA used two different ways to plot the location of the facilities treated in their study. One way was to plot the location of the facilities as a single point, "i.e., the longitude and latitude coordinate for the facility" (USEPA 1998: 8). The second way to plot the locations of the facilities was by the facilities' property boundary that they referred to as "polygons."

While EPA's move to plot facility locations by polygons is an *attempt* at a more realistic representation of the extent of the facilities compared to a point based on longitude and latitude, this move actually obscures more than it enlightens. As noted in the Case Study

chapter, the proposed Shintech facility property was ten times the proposed Shintech facility's actual plant. So, The EPA moved from deploying one abstract entity to another instead of taking into account the actual tangible structure that is readily observable in the actual landscape and is readily observable on remote sensing images as demonstrated on my maps (Figures 19 and 20). The EPA should have used the facility "footprint", that is, the actual physical structure of the facility should have been used for mapping and analyses - not the property boundary or point locations. This is an example of abstract representation of objects - a point based on longitude and latitude, and a property boundary that does not coincide with the actual facility structure – being depicted on maps and utilized as the origin for statistical analyses instead of the actual object (i.e. the actual facility structure) being represented and its' dimensions being used for statistical analyses and depiction. The EPA's reification maneuvers are unwarranted and unnecessary.

Categories of Analysis

> The cartographer's categories – as expressed through conventional signs – are the basis of the morality of the map; they are the framework of cartographic ethics.
> (Harley 1990: 6)

The EPA mapping practices were facility-oriented. My alternative approach demonstrated community-oriented mapping. I suggest that the distinctions between these two orientations are of such significance as to merit consideration as different categories of analysis. The two distinct mapping practices constitute different categories of analysis because each promulgates a different understanding of the socio-spatial relations between community and facilities and each produces a different kind of space.

As reviewed in chapter 2, Lefebvre conceives of a dialectical relationship between society and space. Lefebvre (1991: 59) asserts that "new social relationships call for a new

space, and vice versa." Merrifield (2000: 173) echoes Lefebvre, declaring "to change life is to change space; to change space is to change life."

Facility-oriented mapping promotes the naturalization of petro-chemical industry dominated abstract space. This mapping approach tilts the socio-spatial relations between facilities and communities toward privileging the facilities. Contentious issues between facilities and communities are framed in terms of communities adapting to the facilities. All of the world, or, at least the areas proximate to facilities, both real and proposed, were framed by the *status quo*. The exigencies of capital are mapped as a prescription for communities.

The community-oriented mapping approach I demonstrated asserts social space. My alternative community-oriented approach to mapping unmasks the unwarranted privileging of the facility-oriented method. Community concerns about facilities are mapped and framed from the point of view of the community. My approach is a much needed counter-balance to the industry dominated representations produced by the EPA. My approach is a necessary *complement* to the maneuvers of state and industry.

Heretofore, the facility-oriented approach to mapping was the unquestioned, "natural" method for environmental justice studies, environmental risk assessments, and numerous other facility-siting studies. So thorough was the hegemony of this approach that until I dubbed it "facility-oriented," there was no label for this method. It was natural, universal, and unchallenged because, prior to my "community-oriented" approach, there was no alternative methodology.

Critical theory recommends the ongoing reflective analysis of the "basic categories of understanding" deployed by social science (Calhoun and Karaganis 2001: 180). Categories are neither natural nor inevitable. Furthermore, from the point of view of critical theory, "where

such categories reflect an affirmation of the status quo, or of certain powerful interest, they may be criticized as ideologically biased" (Calhoun and Karaganis 2001: 181).

The EPA's category of facility-oriented mapping was ideologically biased. Facility-oriented mapping both affirmed the status quo and "certain powerful interest," namely, the state and capital. The facilities are privileged as the natural organizing principle of the EPA maps and of the abstract space EPA superimposes on the social space in the Corridor parishes.

Immanent Critique

Immanent critique is a methodology developed by critical theorists to investigate the degree to which a society lives up to its own professed ideals:

> Rather than critique existing social arrangements in terms of a set of ethical values imposed from "outside," however, they sought to judge social institutions by those institutions' own internal (i.e. "immanent") values and self-espoused ideological claims (Billings 1991: 385).

Immanent critique shines a light of the disjuncture between professed ideals and reality. Immanent critique is a useful concept for interrogating Shintech's environmental risk assessment and the EPA's mapping practices. The Shintech environmental risk assessment is considered first. Then EPA's mapping practices are treated.

As reviewed in the Case Study chapter, Shintech reports that they followed EPA risk assessment protocols and calculated that the projected emissions *from their* proposed facility would not exceed EPA acceptable risk thresholds for "hypothetical receptors" at any of the three locations depicted on their diagram. Then, Shintech (1997b) sought to position their calculations as valuable scientific knowledge that contributes to environmental decision-making:

> This risk assessment provides an extremely useful tool for environmental decision-making, in that it allows for a rational and objective evaluation of the scientific data to assess the impact on the health of people in the surrounding population.

But Shintech only considered the toxic emissions from its own facility, not the significant existing toxic burden in the community.

This seems to be a case of a significant disjuncture between the professed ideal and reality. An environmental risk assessment which ignores existing community conditions and calculates human health impacts based solely on the projected emissions from their own facility cannot reasonably claim to fulfill the criteria of a "rational and objective" study. Especially when considering the assumptions Shintech stipulates in their modeling of a hypothetical child at the school nearest the proposed Shintech facility.

Shintech calculated the risk for a hypothetical "child receptor" whose existence is restricted to 8 hours a day, 180 days a year to one disconnected, evidently pristine point in abstract space. Meanwhile, the actual reality in the community is that 16,167,915 pounds of TRI substances were emitted into the air within 4.5 miles of the schools in the community in 1995. Furthermore, 15,932,728 pounds of TRI substances were emitted into the air in 1995 within four miles of the two streets in the community where the majority of the school aged children live who attend the school that was closest to the proposed Shintech facility. Ignoring these very large toxic emissions in a project called an environmental risk assessment is neither rational nor objective.

Please note that the maps I created are *not* maps of exposure to TRI chemicals. I consider the word exposure to be a technical term that refers to the *dose* of a chemical that an organism absorbs. My analysis is not attempting to calculate the dose of TRI substances absorbed by the people in the local community. My maps depict the existing toxic burden in the community as reported in the EPA's TRI data from the point of view of the concerns the SJCJE and other concerned citizens. This is what I call community-oriented mapping. My

mapping is based on the social space that is actually experienced by actual human beings in everyday life.

I am not saying that the EPA thresholds would be exceeded if the existing toxic burden were figured into Shintech's environmental risk assessment. I am saying that Shintech's claim of no impact is unwarranted unless the existing toxic burden is taken into account. My contention is further backed up by Shintech's (1997a: 8) own citation of a National Academy of Science document (1983) stating:

> an exposure assessment should consider the magnitude, duration, and frequency of exposure; the potential routes or pathways by which people may be exposed; the size and characteristics of the population exposed; and the uncertainties in the assumptions used and estimates made.

As reported by Shintech, their environmental risk assessment did not adequately address the very criteria they cite as recommended for an exposure assessment because their calculations considered only a fraction of the potential "magnitude, duration, and frequency of exposure." Such a study does not fulfill the claim of "rational and objective."

I turn now to some of the EPA's professed ideals. The EPA's (1995) Environmental Justice Strategy states:

> Those who live with environmental decisions -- community residents, State, Tribal, and local governments, environmental groups, businesses -- must have every opportunity for public participation in the making of those decisions. An informed and involved community is a necessary and integral part of the process to protect the environment.

This passage states the goals of an "informed and involved community."

However, EPA's mapping practices "informed" the community with ideologically biased maps. All EPA maps depicted the proposed Shintech facility as if it actually existed. The EPA appropriated DEQ's industry-biased appellations of "Industrial Corridor" and "Industrial Parish" for their maps. All maps were organized around TRI facilities. No

communities or very little other evidence of human habitation appear on the EPA's maps of the study area..

If the EPA maps are informative, they are visual aids for reproducing the *status quo*. The EPA (1995) maps do not support their own stated goal: "An informed and involved community is a necessary and integral part of the process to protect the environment."

Viewed in the light of immanent critique, the facility-oriented methodologies of Shintech and EPA seem to fail to fulfill these organizations own stated goals or criteria. I believe the community-oriented approaches I have demonstrated can facilitate these organizations living up to their stated commitments. My maps clearly demonstrate, based on EPA's TRI data, that the community of Convent does indeed have a significant toxic burden that should be considered in any environmental risk assessment for that area. My maps inform the public in an understandable way about environmental conditions in their community and around their schools in a way that the EPA and Shintech did not remotely address.

Abstract Space and Social Space

A key maneuver of the mapping practices of state and industry in the case study was imposing abstract space onto social space. This section explores some of the implications and consequences of these maneuvers.

As noted in Chapter 2, Gottdiener (1985: 143-144) characterizes abstract space as an "instrumental, fragmented space and a hierarchical administrative framework deployed in space." The fragmenting of space is linked to the ways state and capital conceives of space. Gottdiener and Hutchison (2000: 134) write that state and capital "think about space … according to its abstract qualities of dimension -- size, width, area, location -- and profits. In this light, the measuring, subdividing, cataloging, and mapping of land are all part of the

process of fragmenting social space and producing abstract space. Molotch (1993: 889) calls the difference between abstract and social space "a sort of master distinction." This dichotomy discriminates "between those who produce a space for *domination* versus those who produce space as *appropriation* to serve human need" (Molotch 1993: 889 emphasis in the original).

Mapping practices have been deployed for centuries by ruling powers to render social space into abstract space. The history of cartography is replete with examples of empires and states mapping their realms in order to increase their surveillance and control over their domains and thereby convert organic space into instrumental, abstract space. The brief history of GIS, reviewed in chapter 3, illustrates that these historic mapping practices are continuing in a computerized form with this new and continually developing technology. Indeed, GIS technology is, among other things, an abstract space machine.

### Critique of Instrumental Reasoning

Shintech's environmental risk assessment is an example of instrumental reason. Shintech attempted to use technical language and computer modeling to pose as actual knowledge. However, as critiqued in this dissertation, Shintech's environmental risk assessment did not produce knowledge. Shintech's environmental risk assessment was rhetoric constructed by instrumental reasoning grounded in abstract space for the purpose of legitimizing the activities of a multinational corporation in a poor, minority community with a significant existing toxic burden. Shintech's instrumental techniques attempted to obfuscate the actual lived experiences of an actual child in the community.

## Environmental Risk in Abstract Space: Assessing the Assessment

The mapping practices of EPA and the environmental risk assessment by Shintech attempted to naturalize abstract space and make abstract space the context for the

implementation of environmental regulations and the frame for debating environmental conflicts. The EPA maps privileged abstract space over social space and in several ways privileged the agenda of industry over the concerns of the local citizens.

Let us reconsider Shintech's environmental risk assessment, described in the Case Study chapter and the immanent critique section, in light of the concepts of abstract space and social space. Shintech calculated the risk for a hypothetical "child receptor" whose existence is restricted to 8 hours a day, 180 days a year to one disconnected, evidently pristine point in abstract space. Shintech determined that under these conditions, which exist *only* in abstract space, that the EPA's risk thresholds would not be violated. This "truth" has a very specific genealogy: it is a truth of instrumental calculations in abstract space that serve to obfuscate the actual lived experiences of actual children that attend one of the schools in the area.

The maps I produced of the community present a very different view of the environment of actual living children from the instrumental constructions of an abstract "child receptor" in abstract space. The actual, lived, community space in which a real child exists is a pollution sink for millions of pounds of toxic substances.

*The other truth* is that the real, actually existing children of the Convent area live in a heavily polluted community with ample opportunity for exposure to more toxic substances than from the proposed Shintech facility. The hypothetical humans in Shintech's risk assessment exist only in abstract space; consequently, the truth of Shintech's environmental risk assessment for those hypothetical humans exists only in abstract space.

**Legitimacy in Space**

Environmental risk assessments, no matter how sophisticated the modeling, are only legitimate if they pertain to space as experienced by actual human beings. Abstract space is

fragmented, “pulverized” to use Lefebvre’s term (Lefebvre, 1991: 317). The only legitimate space for evaluating environmental risk assessments is social space - the actual community space in which real humans exist. Social space should be the benchmark for the legitimacy of environmental risk assessments.

Dan Borne, president of the Louisiana Chemical Association, seems to be in accord with my assertion:

> If you have plants that emit X pounds of chemicals and each is permitted for a certain amount, I'd have to ask: If you add this up, does it do any harm? That's an area we have to look at very closely with EPA. It gets into the area of chemical soup. As a lay person, I feel like it deserves attention and should not summarily be dismissed with the attitude that 'we all have permits, we're all right.' Realistically that answer does not wash well with the public. (McQuaid 2000)

Borne was referring to permitting procedures not to environmental risk assessments. However, his remarks are directly relevant to the notion of considering toxic emissions in the context of social space instead of abstract space.

The mapping practices of EPA and industry in the Shintech case demonstrate superimposing abstract space onto social space. The mapping practices of state and industry produced, at least cartographically, an abstract space for industrial development.

The citizens, without using the terminology of Lefebvre, were quite aware of the encroaching abstract space on their social space – their community. The citizens of the community requested maps which made a priority of their concerns, namely, the potential health impacts of the proposed Shintech facility on their children and the significant existing toxic burden in the community. The citizens’ request is in accord with environmental justice goals espoused by the EPA. The citizens wished to be informed on topics of their choosing in a manner that made sense to them.

My maps are not replacements for the EPA maps. Rather, the alternative I developed is

a necessary *complement* to the maps of the EPA. My approach is a move *toward* representing the view from social space - the everyday, community space of humans.

# Chapter 7

## Conclusions and Recommendations

> If a picture or map is worth a thousand words, then power in the realms of representations may end up being as important as power over the materiality of spatial organization itself. (Harvey 1990: 233)

### Conclusions

I have challenged the hegemony of abstract space and instrumental reason deployed by the mapping practices of the state and industry, in this case, EPA and Shintech. I have demonstrated an alternative and complementary approach to mapping that asserts community-oriented mapping for environmental justice studies and, potentially, a variety of other local development projects.

The case study demonstrated the need for state mapping institutions to critically examine and make explicit the theoretical frameworks by which they produce their maps. Theoretical frameworks have a direct bearing on mapping practices. These frameworks are integral to the end products of mapping practices. The theoretical framework of EPA, which was grounded in abstract space and instrumental reason, was shown to favor the *status quo* and to be inadequate to fulfill the agency's goals in environmental justice policies.

Shintech's environmental risk assessment was shown to be rhetoric constructed by instrumental reasoning grounded in abstract space for the purpose of legitimizing the activities of a multinational corporation in a poor, minority community with a significant existing toxic burden. The environmental risk assessment did not fulfill Shintech's own criteria for adequacy and it certainly did not fulfill its claim to be "rational and objective." The "truth" of the environmental risk assessment had a very specific genealogy: it was a truth of instrumental

calculations in abstract space that served to obfuscate the actual lived experiences of actual citizens in the community.

I have demonstrated how mapping can be deployed on the behalf of a grassroots environmental group to reassert social space, *community space*, in the face of state and industrial power. My maps proved useful for the SJCJE in their efforts to educate fellow citizens, government workers, and elected officials. My maps contributed to the SJCJE's ability to demonstrate *the other truth* of the Shintech case. The truth of the actual lived experiences of citizens in a heavily polluted community.

In his characterization of critical geography, Gregory follows the lead of the critical theorist by emphasizing the importance of scholarly work engaging with society. Gregory states "I hope that critical human geography can help to make social life not only intelligible but also *better*." (1994: 76).

I share Gregory's goal. I hope that the emancipatory mapping that I have demonstrated contributes to that process.

**Recommendations**

Below are three recommendations based on my critique of state and industry mapping practices and my alternative approach to mapping in the Shintech case. Explanatory text follows each recommendation.

The DEQ and the EPA should require all environmental risk assessments submitted by industry for a proposed facility to take into account the existing toxic burden in the community.

Allowing industry to submit environmental risk assessments based solely on the proposed emissions from their respective proposed facilities is a disservice to the citizens supposedly protected by these agencies. As noted above, even Dan Borne, president of the

Louisiana Chemical Association, has gone on record as supporting the spirit of my recommendation.

This recommendation points to the significant practical consequences of theoretical frameworks, acknowledged or denied. The state should not propagate abstract space and instrumental reason nor should the state allow industry to do so. Environmental risk assessments, no matter how sophisticated the modeling, are only legitimate if they pertain to space as experienced by actual human beings. If EPA is unsuccessful in requiring industry to perform the necessary calculations to pass this legitimacy test, then the EPA should conduct the modeling.

The EPA and other government agencies should complement their facility-oriented mapping and analysis with the community-oriented mapping and analysis I have demonstrated.

As detailed in the Case Study and Discussion chapters, the facility-oriented approach to mapping and analysis privileges abstract space over social space, instrumental reason over emancipatory reason, and is inadequate to fulfill EPA's own professed environmental justice goals.

The community-oriented approach I demonstrated is not a panacea. However, my alternative better represents social space, the community space as experienced by actual humans, than the facility-oriented approach taken by the EPA. My approach provides some measure of emancipatory response to the hegemony of instrumental reason. Furthermore, in accord with EPA's environmental justice goals of an informed citizenry, I believe I have demonstrated that my approach provides citizens with better information about their communities in a more understandable form than EPA's maps.

The EPA and all other government agencies should clearly and consistently label any

proposed facilities as such in any and all text and maps produced for any and all purposes. Government agencies should institute quality control measures to enforce this standard.

Each map EPA produced for their investigation into DEQ depicted the proposed Shintech facility as if it actually existed. The determination of whether or not this maneuver was an accident is outside the scope of this dissertation. EPA's perfect consistency on this matter certainly provoked my misgivings as it did with members of the SJCJE, LEAN and other interested parities. Regardless of EPA's intentions, this maneuver is tantamount to a state endorsement of a markedly contentious proposed facility. Given the high level of controversy generated by the Shintech case, this maneuver was particularly egregious and patently indefensible.

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## Vita

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